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EPA Superfund
Record of Decision:

ORDNANCE WORKS DISPOSAL AREAS
EPA ID: WVD000850404
OU 01
MORGANTOWN, WV
09/30/1999

RECORD OF DECISION
ORDNANCE WORKS DISPOSAL AREAS SUPERFUND SITE
OPERABLE UNIT ONE

DECLARATION

SITE NAME AND LOCATION

Ordnance Works Disposal Areas Superfund Site
Morgantown, Monongalia County, West Virginia

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit No. 1 ("OU1") of the Ordnance Works Disposal Areas Site ("Site") located in Morgantown, Monongalia County. West Virginia, developed and chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C.§§ 9601 et seq., and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. Part 300. This decision is based on the Administrative Record for this Site.

The West Virginia Division of Environmental Protection has concurred with the selected remedy by letter dated September 29, 1999 (*see* Appendix B of the Record of Decision).

RECISION OF PREVIOUS RECORD OF DECISION

This document supersedes the September 29, 1989 Record of Decision issued for Operable Unit No. 1 of the Ordnance Works Disposal Areas Superfund Site.

ASSESSMENT OF THE SITE

I hereby determine, pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, that actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this Record of Decision ("ROD"), may present an imminent and substantial endangerment to the public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This ROD selects a remedial action for implementation at OU1 of this Site and supersedes the ROD for Operable Unit No. 1 issued on September 29, 1989. This selected remedy is intended to be the final response action for the Site. The selected remedy includes the following components:

- Excavation and offsite treatment of all soils and sediments contaminated with visibly stained tar-like material from the Lagoon Area, Scraped Area, and stream/wetland sediments;

- Excavation and consolidation into the existing landfill of all soils and sediments in the Lagoon Area, Scraped Area, and the streams that are contaminated above the cleanup standards established in this ROD;

- Backfilling, regrading, revegetating, and restoring the areas that have been excavated:

- Restoration of streams and wetland areas where sediment has been excavated:

- Construction of a multi-layer RCRA cap over the existing landfill:

- Long-term monitoring;

- Maintenance of the existing perimeter fence; and

- Institutional controls.

STATUTORY DETERMINATIONS

I hereby determine that the selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate requirements ("ARARs") to the remedial action, and is cost effective.

The principal threat presented by the highly concentrated carcinogenic polycyclic aromatic hydrocarbons ("cPAHs") in the visibly stained tar-like material onsite will be addressed as a part of this Remedial Action. The reduction of cPAHs via offsite thermal treatment will be permanent and satisfies the statutory preference for remedial actions in which treatment that reduces toxicity, mobility, or volume is a principal element. The selected remedy utilizes permanent solutions and innovative treatment technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining onsite above levels that allow for unlimited use and unrestricted exposure, a review will be conducted every five years after initiation of the remedial action in accordance with Section 121 (c) of CERCLA, 42 U.S.C. § 9621 (c), to ensure that human health and the environment continue to be adequately protected by the remedy.

Abraham Ferdas, Director Hazardous Site Cleanup Division	9/30/99 Date

RECORD OF DECISION
OPERABLE UNIT ONE
ORDNANCE WORKS DISPOSAL AREAS SUPERFUND SITE

DECISION SUMMARY

I. SITE NAME, LOCATION AND DESCRIPTION

The Ordnance Works Disposal Areas Superfund Site ("Site") is located in Monongalia County along the west bank of the Monongahela River approximately one mile southwest of the City of Morgantown, West Virginia (*see* Figure 1). The property on which the Site is located consists of approximately 800 acres and is wooded with rolling hills. A small portion of this property was used as a disposal ground during manufacturing operations and later became known to EPA as Operable Unit No. 1 ("OU1") of the Site. The remaining tracts of land within the property containing, among other things, the manufacturing facilities, are known to EPA as Operable Unit No. 2 ("OU2") of the Site (*see* Figure 2). This Record of Decision ("ROD") addresses OU1 only.

OU1 consists of approximately four to six acres and is located at the southern end of the Site property. Major OU1 features include an inactive, abandoned landfill; a former lagoon area; an area referred to as the "scraped area" formerly used for the shallow disposal of wastes; and contaminated stream sediments (*see* Figures 3 and 4). There is also a small wetland area located adjacent to the onsite landfill. This wetland area is approximately one half acre in size and is depicted on Figure 5.

There are no domestic or municipal wells used for drinking water supply in the vicinity of the Site. The area population draws drinking water from a surface water intake on the Monongahela River located approximately one mile downgradient of the Site.

II. SITE HISTORY AND ENFORCEMENT ACTIVITY

The property where the Site is located consists of numerous tracts of land containing approximately 800 acres originally assembled by E.I. DuPont de Nemours & Company ("DuPont") between 1940-1943 pursuant to agreements between DuPont and the United States. These agreements additionally provided for the construction and operation of chemical manufacturing facilities. The Site property has contained active chemical production facilities since the 1940's. Between 1943 and 1962, the United States held legal title to these facilities. Between 1941 and 1958, various operations were conducted by private parties, in some cases pursuant to government contracts and operating agreements, and in other cases pursuant to commercial leases. During this time, the facilities were used to produce, among other substances, hexamine, ammonia, methyl alcohol, formaldehyde, ethylene diamine, and coke. From 1958 through 1962, the plant was idle.

In 1962 the property was sold to Morgantown Ordnance Works, Inc. Between 1962 and 1978, Morgantown Ordnance Works, Inc. leased and/or sold portions of the Site property for various industrial and chemical manufacturing activities. In 1964, Weston Chemical Company ("Weston") purchased a small parcel at the Site. Weston subsequently expanded its operations. This expansion continued after 1969, when Borg-Warner Corporation ("Borg-Warner") purchased Weston, with the result that Borg-Warner ultimately operated two plants and laboratories on company-owned property amounting to approximately 62 acres at the Site. In 1988, General Electric Company ("GE") purchased Borg-Warner's operations. The GE facilities are currently active and are being investigated by the company under a Resource Conservation and Recovery Act ("RCRA") agreement with EPA.

Except for parcels previously sold, the Site was acquired by Princess Coals, Inc. in 1978. In 1982, the Site was purchased by private individuals who later formed Morgantown Industrial Park, Inc. In 1983, the property was conveyed to Morgantown Industrial Park Associates. Limited Partnership ("MIPA"), the current property owner.

As a result of the manufacturing operations conducted at the Site, hazardous substances were generated and subsequently disposed at, among other places, OU1 at the Site. Contamination at OU2, except for the aforementioned GE facilities, was addressed through a removal action completed in 1997. The area referred to as OU1 was proposed for inclusion on EPA's National Priorities List ("NPL") on October 15, 1984 and was finalized on the NPL on June 10, 1986.

In January 1988, EPA completed a Remedial Investigation and Feasibility Study for OU1. At that time, soils and sediments within the contaminated areas of OU1 were determined to be a principal threat because of the potential for direct dermal contact and ingestion of soils and sediments.

In March 1988, EPA issued a ROD for OU1 calling for onsite incineration of soils and sediments contaminated with carcinogenic polycyclic aromatic hydrocarbons ("cPAHs") and heavy metals. In November 1988, EPA opened an additional thirty day comment period for responsible parties to comment on the ROD [1]. Based on comments received during this period, EPA conducted a focused feasibility study ("FFS") in 1989 to re-evaluate the alternatives described in the March 1988 ROD and to conduct a risk-based analysis of cleanup levels. This FFS was completed in June 1989.

On September 29, 1989, EPA issued a new ROD selecting a "preferred" and "contingency" remedial action for OU1 of the Site. The "preferred" remedial action involved,

[1] The Agency concluded that the out-of-state responsible parties had not received notice of the original Proposed Plan for OU1.

among other things. excavation and treatment of inorganic hot spots from the lagoon and scraped areas; disposal of treated inorganic contaminants at the former landfill area, capping the former landfill; and excavation and treatment of organics-contaminated soils and sediments using bioremediation. The "contingency" remedial action called for treatment of soils and sediments using soil washing technology. In June 1990, EPA issued an administrative order directing several responsible parties to implement the September 1989 ROD for OU1.

The human health risk assessment [2] that was conducted in conjunction with the OU1 Remedial Investigation ("RI") completed in 1988 was performed prior to the issuance of the new cancer potency factor ("CPF") established in IRIS [3] for Benzo(a)pyrene and the interim comparative potency estimates provided by EPA's Office of Research and Development ("ORD") in the guidance document entitled "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons" (EPA/600/R-93/089 (July 1993)). In 1995, during implementation of EPA's June 1990 administrative order, the responsible parties recalculated the cleanup standards for cPAHs at the Site using the new CPF established in IRIS, and the interim comparative potency estimates established by ORD. The resulting cleanup standard was less stringent than the cleanup standard identified in the September 1989 ROD. The responsible parties then submitted a proposal to EPA in July 1995 requesting that the Agency adopt the newly calculated cleanup standard of 78 ppm total cPAHs. EPA evaluated this proposal using a Monte Carlo simulation and determined that this cleanup level would result in risk within the acceptable risk range established in the NCP. [4] EPA agreed to adopt the new cPAH cleanup level for OU1.

The responsible parties completed treatability studies for the bioremediation component in March 1997 under EPA's June 1990 administrative order. The responsible parties concluded and EPA agreed that bioremediation was not capable of meeting the 78 ppm. total cPAH cleanup standard within a reasonable time-frame and was not cost-effective. The responsible parties and EPA additionally concluded that the soil washing contingency action described in the September 1989 ROD was similarly deficient. In the Spring of 1997, the responsible parties submitted a proposal to EPA to conduct a second Focused Feasibility Study ("FFS") to identify a more effective remedy for OU1. EPA agreed and negotiated a new agreement with such parties for this

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[2] An ecological risk assessment was not conducted as part of the 1988 RI.

[3] IRIS (Integrated Risk Information System) is a database containing Agency consensus scientific positions on potential adverse human health effects that may result from exposure to environmental contaminants.

[4] The Monte Carlo risk assessment concluded that 78 ppm total cPAHs is an acceptable cleanup standard as long as the associated Benzo (a) Pyrene (B(a)P) equivalent value does not exceed 18 ppm. Achieving 18 ppm B(a)P equivalents will be part of the cPAH cleanup standard (*see* footnote 16 and accompanying text).

work in October 1997. In December 1997, while the draft FFS report was under review by EPA and the West Virginia Division of Environmental Protection ("WDEP"), the State requested that more recent groundwater data be collected from OU1. In response to this request, groundwater sampling was conducted in January 1998. This groundwater data revealed no significant contamination and was incorporated into the FFS report. The FFS report was approved by EPA on September 9, 1998.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Pursuant to section 113(k)(2)(B) of the Comprehensive Environmental Response. Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. § 96113(k)(2)(B). EPA released for public comment the final FFS report and the Proposed Remedial Action Plan ("Proposed Plan") setting forth EPA's new preferred alternative for Operable Unit No. 1 of the Ordnance Works Disposal Areas Site on June 7, 1999. EPA made these documents available to the public in the Administrative Record located at the EPA Region III offices in Philadelphia. Pennsylvania, and at the Morgantown Public Library in Morgantown, West Virginia. The notice of availability of these documents was published in The Dominion Post on June 7, 1999. A public comment period was held from June 7, 1999 to July 8, 1999. In June 1999, EPA issued a Fact Sheet announcing the availability of the Proposed Plan and the date for the public meeting. The June 1999 Fact Sheet discussed EPA's Preferred Alternative, as well as other alternatives evaluated by EPA, and solicited comments from all interested parties. In addition, EPA conducted a public meeting on June 23, 1999. At this meeting, EPA and WVDEP representatives answered questions about conditions at the Site and the remedial alternatives under consideration.

The responses to comments received during the public comment period are included in the Responsiveness Summary which is part of this ROD.

This decision document presents the selected remedial action for OU1 of the Ordnance Works Disposal Areas Superfund Site, Monongalia County, West Virginia, chosen in accordance with the CERCLA and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 C.F.R. Part 300. The selection of the remedial action for this Site is based on an Administrative Record which is available for public inspection (*see* footnote 5).

IV. SCOPE AND ROLE OF THE RESPONSE ACTION

The selected remedial action described in this ROD is intended to be the final response action for OU1. The selected remedy eliminates unacceptable risks and hazards presented to both human health and the environment from contamination at OU1. This ROD supersedes the OU1 ROD issued by EPA on September 29, 1989.

OU2 was remediated via a removal action in 1997. EPA does not anticipate further CERCLA response actions within OU2 of the Site, expansion of the NPL listing to include OU2, or issuance of a ROD for OU2. Although cleanup actions deemed necessary by EPA at the GE properties within OU2 will likely occur under RCRA. the Agency has reserved its right to perform or require CERCLA response actions in connection with such properties.

I. SUMMARY OF SITE CHARACTERISTICS AND EXTENT OF CONTAMINATION

A. Site Characteristics

1. Topography

The topography at the Site, including OU1, is typical of the Allegheny Plateau, with steep hilly slopes and narrow valleys drained by short tributary streams. Ground surface elevations range from 950 feet above mean sea level ("msl") in the lowest areas of OU2 to 1.010 feet above msl at the Lagoon Area within OU1.

2. Surface Hydrology

All surface drainage in Monongalia County runs to the Monongahela River, which flows in a northwesterly direction across the county. The system is principally dendritic. Erosional terraces, high in the Monongahela River valley walls, indicate lake and stream erosional surfaces at various stages in the regional drainage development. After the terraces were formed, they were covered with thin deposits of sand, silt, and clay. The Monongahela River and its tributaries provide water supplies and outlets for sewage disposal for cities and industries situated along the valleys. The closest drinking water intake for the City of Morgantown is approximately one river mile downstream from OU1. This intake is located on the river bank opposite the Site.

3. Hydrogeology

Groundwater at the Site occurs primarily in the sandstone bedrock under semi-confined to confined conditions. To a lesser extent, perched groundwater may also occur within the unconsolidated sediments overlying the bedrock. The groundwater flow direction is easterly toward the Monongahela River. There are no direct groundwater users present between OU1 and the Monongahela River.

The groundwater at the Site is recharged by precipitation. Approximately 42.3 inches of rainfall occur annually in the Morgantown area. Between 4.2 and 10.5 inches of rain recharge both the localized, discontinuous, shallow, perched water and the deeper, regional, bedrock aquifer. The depth to groundwater at OU1 ranges from approximately 30 feet to 88 feet in the bedrock aquifer at OU1.

4. Population Demographics

The population in Monongalia County increased from 63,714 to 73,981 over the years 1970 to 1980. In 1983, the county population was 78,842. The city of Morgantown itself had a population of 30,681 in 1980.

According to 1990 census information, the population of Monongalia County is 75,509 and the population of the city of Morgantown is 25,879. The population is approximately 49.60% male and 50.4% female and is broken down by race as follows: 95% Caucasian, 2.4% African American, 21.% Asian, 84% Hispanic, 24% other, and 17% American Indian, Eskimo, or Aleut. More than half of the people living in Monongalia County are younger than 40 years old. The population is broken down by age as follows: 28.2% under 20 years old, 38.6% between 20 and 39 years old, 18.6% between 40 and 59 years old, 12.2% between 60 and 79 years old, and 2.4% 80 years old or older.

5. General Site Geology

Consolidated sedimentary rocks of the Mississippian, Pennsylvanian. and Permian Ages are present in Monongalia County. In the area of the Site, the upper unit is the Conemaugh series, a sedimentary rock unit composed of lenticular gray and brown sandstone interbedded with siltstone and gray and red sandy shale, thick beds of red shale, thin beds of freshwater and marine limestone, and thin coal beds underlain by clays. The Conernaugh is of Pennsylvanian Age and is exposed at the surface in West Virginia in a band about 6 miles wide, which trends northeastward through the Site, locally dipping very gently to the southeast. The thickness of the Conemaugh series in Monongalia County is from 550 to 600 feet.

The Conernaugh series contains a large number of shale members that weather to form clays. These clays are characterized by low permeability and, therefore, inhibit the infiltration of water and promote surface runoff.

B. Nature and Extent of Contamination

EPA has developed an extensive amount of information detailing conditions at OU1. A majority of the analytical data was obtained during the 1988 Remedial Investigation (“RI”), during which groundwater, surface and subsurface soils, surface water, and sediments were sampled. In 1996, after several years of treatability studies were conducted in support of the OU1 remedy selected by EPA in 1989 (bioremediation), EPA arranged for extensive sampling in the Lagoon Area and Scraped Area (the data from this sampling is presented in the report entitled “Phase II Interim Design Tasks Report”). Additional groundwater data was obtained in January

1998. The data evaluated by EPA for purposes of this ROD are available for review in the Administrative Record.[5] This section summarizes Site characteristics based on the sources discussed above.

1. Groundwater

As part of the 1988 RI, six monitoring wells were installed into the bedrock formation at the Site, in areas both upgradient and downgradient of suspected contamination sources. Two rounds of groundwater sampling were conducted during the RI. the first in March 1986 and the second in January 1987. During the 1986-87 groundwater sampling events, manganese and iron
were detected at levels above Secondary Drinking Water Standards.[6] Methylene chloride and toluene were detected in nearly every sample; however, these constituents were also detected in trip and field blanks, indicating that cross contamination at the laboratory was the most likely source of these detections.

Additional groundwater samples were collected in January 1998 at the request of the WVDEP. During this 1998 groundwater sampling event, both manganese and iron concentrations again exceeded Secondary Drinking Water Standards. However, neither manganese nor iron exceeded Region III's risk based concentrations (“'RBCs”)[7]. Data from the 1998 groundwater sampling indicated that the RBC for arsenic (.045 ug/l) was exceeded. A concentration of 23 ug/l arsenic was detected in monitoring well DG-03). However, the maximum contaminant level (“MCL”)[8] for arsenic is 50 ug/l. There were no MCL exceedances in either the 1986-87 sampling events or the 1998 sampling event. The groundwater at and downgradient of OU1 is not used as a drinking water source.

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[5] The Administrative Record can be viewed at the following locations: Morgantown Public Library, 373 Spruce Street, Morgantown, WV 26505; and the U.S. EPA-Region III Docket Room, 1650 Arch Street, Philadelphia, PA 19103

[6] Secondary Drinking Water Standards are unenforceable federal guidelines regarding taste, odor, color, and certain other non-aesthetic effects of drinking water.

[7] EPA Region III Risk-Based Concentration Table, originally developed by Roy L. Smith, Ph.D., Toxicologist, revised 4/12/99 by Jennifer Hubbard, Toxicologist. Also found at http://www.epa.gov/reg3hwmd/risk/riskmenu.htm.

[8] Safe Drinking Water Act Maximum Contaminant Levels (MCLs) are enforceable federal standards for public drinking water supplies.

Neither the March 1988 ROD nor the September 1989 ROD required actions to address groundwater. There is no evidence that the groundwater has been significantly impacted by disposal operations at OU1 and no unacceptable risks are posed to receptors of the groundwater at OU1 Therefore, the remedy selected in this ROD does not include a groundwater remediation component. EPA does not anticipate the need for a groundwater remedy in the future. However, this does not preclude the implementation of a groundwater remedy should future conditions indicate that one is necessary.

2. Landfill

The currently inactive landfill was formed when solid and chemical wastes were disposed of in and around an existing ravine. The landfill was reportedly active from 1942 to 1962. There are no records regarding the types or quantities of waste material that were disposed of in the landfill. Information obtained from various witnesses indicates that landfilled wastes included construction debris, slag, ash, and catalyst pellets. To characterize the Landfill Area, three test pits were dug and sampled during the RI. Test pitting results indicated a fill depth of 16 to 20 feet. Contaminants detected in the landfill test pits are identified in Table 1 below.

TABLE 1 - LANDFILL SAMPLING RESULTS

Contaminant	Concentration (ppm)
Arsenic	6.9- 300
cPAHs	9.6– 1,700
Lead	10.0– 2,000
Copper	21.0– 67,800

The 1989 FFS Report estimated the volume of the landfill at 29,150 yd^3, based on an estimated area of 1.08 acres. During the 1997 removal action at OU2, approximately 10,000 yd^3 of soils contaminated with lead (1,600 ppm) and total cPAHs (up to 146 ppm) were removed from the Coke Ovens and By-Products Area and relocated to OU1 for consolidation into the landfill.[9] These contaminated soils were placed adjacent to the landfill and covered with a geotextile layer and approximately eight inches of backfill material. The area was then seeded and surrounded with a silt fence to prevent erosion.

The responsible parties have estimated the area of the landfill to be approximately 1.6 acres. Using this figure, the revised estimate of landfill volume becomes 46,773 yd^3 This volume

[9]The Coke Ovens and By-Products Area is one of nine specific areas that were remediated during the 1997 removal action at OU2.

estimate is a conservative one and was used to estimate the costs of the remedial alternatives identified in the 1998 FFS Report. The actual boundaries/volumes associated with the Landfill Area will be established during Remedial Design. The Landfill Area is generally depicted in Figure 3.

3. Scraped Area

This area consists of bare soil adjacent to the landfill where solid wastes (*e.g.*, construction debris, oil-stained soils, and catalyst pellets) were buried. This area slopes north and east in the direction of the Monongahela River. Ten test pits were dug in the scraped area during the 1988 RI. The pits contained cinder-like back fill material, catalyst pellets (blue and black), and yellow solid materials.

In 1996, as part of the Phase II Interim Design Tasks work, samples were taken from the Scraped Area, Lagoon Area, and the streams in an attempt to ftirther define volumes of soil/sediment to be remediated. Thirty-six soil borings were drilled in the Scraped Area on a grid of approximately 150 by 350 feet. Visible tar was present in samples up to eight feet in depth. The concentrations of total cPAHs in this area ranged from 94 ppm to 36.000 ppm. The estimated volume of soils that are contaminated above the total cPAH cleanup standard is 2,000 yd^3. Analysis of samples taken in this area in 1996 did not confirm the presence of inorganic contaminants at concentrations detected during the 1988 RI (EPA has not identified a reason for this data variation). The Scraped Area is generally depicted in Figure 3.

4. Former Lagoon Area

Between approximately 1970 and 1976, a subsidiary of Rockwell International Corporation disposed of metal plating wastes containing chromium in two lagoons located adjacent to the landfill. Between March and September 1981, under the supervision of the West Virginia Department of Natural Resources (now known as the West Virginia Division of Environmental Protection), these lagoons were excavated and their contents disposed of offsite. During the OU1 RI soil boring program, EPA observed miscellaneous wastes, including coal tars, in this area.

Sample results from soil borings taken during the RI indicate that chromium was present at concentrations only slightly above background levels, the highest concentration being 2.690 ppm--well below Region III's current risk-based concentration level for Chromium VI (10,000 ppm). Arsenic and copper were also detected in the test pit samples but not at concentrations above their respective soil cleanup standards.

Organic contamination was also detected in soil borings from the Lagoon Area during the RI. Volatile organic compounds (“VOCs”) including xylene (10,000 ppb), toluene (4,100 ppb), benzene (3,400 ppb), and methylene chloride (2,900 ppb) were detected at elevated levels.

However, these concentrations are not above the Region III RBC's for industrial soils.

The most notable organic contamination found in the Lagoon Area was cPAHs. which are semi-volatile in nature. Total cPAHs were detected at concentrations as high as 31,800 ppm.

In 1996, as part of the Phase II Interim Design Tasks work. 103 soil borings were drilled in the Lagoon Area on a grid of approximately 330 by 380 feet. Fill material such as brick/concrete fragments, black cinders, and tar were visible in most of the borings. Total cPAH concentrations in this area ranged from 3.2 ppm to 30,000 ppm. The estimated volume of soils contaminated above the cPAH cleanup standard (including visibly stained tar-like material) is 24,000 yd^3. Analysis of samples taken in this area in 1996 did not confirm the presence of inorganic contaminants at concentrations detected during the 1988 RI. The Lagoon Area is generally depicted in Figure 3.

5. Contaminated Surface Water, Stream Sediments, and Wetlands

Surface water and sediment samples were obtained from four streams during the RI which was completed in 1988. Elevated levels of total cPAHs (up to 318 ppm) were detected in stream sediments. The RI/FS Report also indicated that surface water and sediments downgradient of the Site contained elevated levels of several inorganic compounds. The concentrations of such inorganic compounds in sediments are well above the background levels (*see* Table 7 on page 17).[10] The contaminant concentrations in surface water and sediment that present ecological concerns are identified in Table 2 below.

TABLE 2 - RI SURFACE WATER AND SEDIMENTS SAMPLING RESULTS

Contaminant	Sediment Concentration (ppm)	Surface Water Concentration
Arsenic	253	N/A
Copper	2,150	553 ppm
Lead	920	N/A
Mercury	5.4	1.2 ppb
Zinc	25,100	44 ppm

[10] Existing background levels are identified in "Report of Findings, Sediment and Soil Sampling For Proposed Outsale Property, Ordnance Works Disposal Areas Superfund Site Operable Unit Two" (MSES Consultants, Inc. (August 1994)), which is included in the Administrative Record.

In 1996, as part of the Phase II Interim Design Tasks work, only three drainage areas from the Site were identified. Samples from these drainages areas were taken at 100 foot intervals (*see* Figure 4). These samples were analyzed solely for cPAHs. Results of this analysis were as follows:

Table 3 - Sediment Sampling Results

Drainage Swale No.	cPAH Concentration Range (ppm)
1	5.7 - 1.686
2	1.1 - 65
3	19.2 - 221

The total estimated volume of contaminated sediments above the cPAH cleanup standard from all three streams combined is 500 yd^3. This volume estimate is based on cPAH contamination and does not necessarily include sediments contaminated with inorganic compounds above background levels.

An ecological risk assessment was not conducted as part of the 1988 RI. During a recent review of the RI data, EPA's Biological Technical Assistance Group ("BTAG") identified a potential concern to ecological receptors due to the inorganic contaminants that were detected in the surface water and stream sediments during the 1988 RI (*see* Table 2 on page 10). These contaminants, if still present at the concentrations listed in Table 2, are believed to coincide in location with the elevated cPAH concentrations in sediments.

A wetland area associated with the onsite landfill in the northeastern portion of OU1 was identified by the responsible parties during the Phase II Interim Tasks Remedial Design work completed in 1996. This wetland area has been delineated and adverse impacts will be mitigated as appropriate as part of remediation activities. The wetland area is depicted in Figure 5.

VI. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Neither OU1 nor the land immediately adjacent to OU1 is currently being used in a commercial, industrial, or residential capacity. Within one mile of OU1 the land uses range from active chemical production facilities to the northeast (e.g., GE Specialty Chemicals) to residential areas to the west. EPA assumes that OU1 will be used for commercial/industrial purposes following remediation. At present, EPA is not aware of any plans for the reuse of the OU1 property. EPA and WVDEP will work closely with the property owner to ensure that future use does not adversely impact the selected remedial action

VII. SUMMARY OF SITE RISKS

As part of the 1988 RI/FS report, EPA prepared an Endangerment Assessment for the Site in order to identify and define possible existing and future human health risks associated with exposure to the contaminants present in the various media at OU1 if no action were taken. This Endangerment Assessment was revised in the 1989 FFS report.[11] In both the 1988 original and 1989 revised Endangerment Assessment documents, EPA concluded that action is necessary to prevent contact with contaminated soil and sediments found at OU1 of the Site. The Endangerment Assessment and all supporting environmental data can be found in the Administrative Record.

A comprehensive Ecological Risk Assessment was not conducted during either the 1988 RI/FS or the 1989 FFS. Following a recent review of the 1988 RI data. EPA's BTAG concluded that inorganic contaminants are present in surface water and sediments within OU1 at levels that are acutely toxic to potentially affected ecosystems[12].

A. Human Health Endangerment Assessment

In the 1988 Endangerment Assessment, EPA considered the impact of Site-related contamination on human health for both present and future potential exposure pathways. EPA concluded that OU1 presented an unacceptable risk to human health from soil and sediment contamination. Groundwater was not determined to be a contaminant exposure pathway. The remedy selected in the 1988 ROD, onsite incineration and containment, focused on source control of contaminants in soils and sediments. The risk-based cleanup level for soils and sediments was established at 20 mg/kg arsenic and 26 mg/kg total cPAHs, based on a future use scenario in which construction workers were exposed to Site-related contaminants.

In November 1988, EPA opened an additional thirty day comment period for responsible parties to comment on the ROD. Based on comments received during this period, EPA conducted a focused feasibility study ("FFS") in 1989 to re-evaluate the alternatives described in the March 1988 ROD and to conduct a risk-based analysis of cleanup levels. During this analysis, EPA specifically focused on eight contaminants: cPAHs, arsenic, cadmium, chromium, copper, lead, mercury, and zinc. The exposure pathways and use scenarios evaluated in the 1988

[11]The term "Endangerment Assessment" is no longer used in the risk assessment field. Current guidance refers to a Baseline Human Health Risk Assessment when evaluating human health risk. For the purposes of this document, "Endangerment Assessment" will be synonymous with "Baseline Human Health Risk Assessment"

[12]Memorandum from Jeffrey Tuttle to Melissa Whittington re "Comments" (August 25, 1998).

Endangerment Assessment were used in the analysis. This analysis was used in establishing the cleanup levels set forth in Table 4 below, for the 1989 ROD. Cleanup levels were not identified for chromium, mercury, and zinc because the maximum concentrations detected during the 1988 RI were at concentrations that were below the risk-based cleanup levels.

TABLE 4 - SOIL/SEDIMENT CLEAN-UP LEVELS SET IN THE 1989 ROD

CONTAMINANT	**CLEAN-UP LEVEL** (mg/kg)
Total cPAHs	44.7
Arsenic	88.8
Cadmium	642
Copper	41,100
Lead	500

The Endangerment Assessment was prepared prior to issuance of the new cancer potency factor ("CPF") established in IRIS[13] for Benzo(a)pyrene and the interim comparative potency estimates provided by EPA's Office of Research and Development ("ORD") in the guidance document entitled "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons" (EPA/600/R-93/089 (July 1993)). In 1995, during implementation of EPA's June 1990 administrative order, the responsible parties recalculated the cleanup standards for cPAHs at OU1 using the new CPF established in IRIS, and the interim comparative potency estimates established by ORD. The resulting cleanup standard was less stringent than the cleanup standard identified in the September 1989 ROD (44.7 ppm total cPAHs). The responsible parties then submitted a proposal to EPA in July 1995 requesting that the Agency adopt the newly calculated cleanup standard of 78 pprn total cPAHs.

While evaluating the responsible parties' proposal, EPA re-evaluated the exposure scenarios identified in the original Endangerment Assessment. EPA determined that the "future construction worker" scenario was unrealistic and did not adequately assess the potential risks posed by contamination at OU1 under the future use scenario. EPA determined that an "industrial worker" -- an individual who would be potentially exposed to soils and sediments while working at an industrial facility located at OU1 following completion of remediation--would more accurately depict risks to human health arising from future use of OU1. The potential exposure pathways that were considered when evaluating the proposed cPAH cleanup

[13] *See* footnote 3.

standard are shown in Table 5 below.[14] Three exposure pathways--ingestion of soil/sediment, dermal contact, and inhalation of dust -- are relevant to the future use exposure scenarios identified below in Table 5.

TABLE 5 - POTENTIAL FUTURE-USE EXPOSURE SCENARIOS

EXPOSURE MEDIUM	POTENTIAL CONTAMINANT SOURCE	TRANSPORT MECHANISM	POTENTIALLY EXPOSED POPULATION	POTENTIAL EXPOSURE PATHWAY
Soils/sediments	Contaminated soils	Direct contact by an industrial worker	Industrial workers, unauthorized persons	Ingestion of soil/sediment, dermal contact
Air	Contaminates soils	Incidental dust generation	Industrial workers, unauthorized persons	Inhalation of dust

EPA incorporated the "industrial worker" future use scenario into its evaluation of the responsible parties' 1995 proposal to revise the cPAH cleanup standard.[15] Using a Monte Carlo simulation. EPA determined that as long as a B(a)P equivalence of 18.2 ppm is achieved, cleanup to 78 ppm total cPAHs would result in risk that is within the acceptable risk range established in the NCP.[16]

Excess lifetime cancer risks for carcinogens are determined by multiplying the intake contaminant level with the Cancer Potency Factor ("CPF"). These risks are probabilities generally expressed in scientific notation (e.g., 1×10^{-6}) . An excess cancer risk of 1×10^{-6} indicates that an individual has a one in one million chance of developing cancer as a result of site-related exposure

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[14] No unacceptable human health risks have been identified for the current-use exposure scenario. Therefore, both the 1989 ROD and this ROD focus on the future-use exposure scenario.

[15] When identifying the potentially exposed populations, the Proposed Plan incorrectly referred to the "construction worker" exposure scenario. EPA considered the "industrial worker" exposure scenario and not the "construction worker" exposure scenario when it prepared the Proposed Plan.

[16] Hereinafter in this document the term "cPAH Cleanup Standard" shall refer to achievement of both 78 ppm total cPAHs and 18.2 ppm B(a)P equivalents.

to a carcinogen over a lifetime under specific exposure conditions at a site. Potential concerns for effects from non-carcinogens are expressed by calculating a hazard index. The hazard index provides a useful reference point for determining the potential significance of contaminant exposure. A hazard index that exceeds 1.0 is unacceptable.

Risk-based cleanup levels for soil and sediments identified in the September 1989 ROD for the inorganic contaminants at OU1 were not revised and are shown in Table 6 below. The revised cleanup standard for cPAHs is also shown in Table 6. Following cleanup of arsenic and cPAHs to their respective risk-based levels, the carcinogenic risk from exposure to arsenic will be 2.34 X 10^{-5}, the carcinogenic risk from exposure to cPAHs will be 2.65 X 10^{-5}.[17] and the combined carcinogenic risk from exposure to arsenic and cPAHs will be 5 X 10^{5}[17] Therefore, the risk from exposure to site-related carcinogens after completion of the cleanup action will be within EPA's acceptable risk range of 1 X 10^{-4} to 1 X 10^{-6}.

Following cleanup of the non-carcinogenic contaminants of concern -- cadmium. copper and lead -- to their respective risk-based levels, the risk from exposure to these compounds will result in an HI of less than one.

TABLE 6 - CLEAN-UP STANDARD

CONTAMINANT	**CLEAN-UP LEVEL** (mg/kg)
Total cPAHs	78 (18.2 B(a)P equivalent
Arsenic	88.8
Cadmium	642
Copper	41,100
Lead	500

B. Environmental Risk Evaluation

The principal purpose of an ecological risk assessment is to determine the extent to which ecological receptors at a site, if present, are exposed to unacceptable risks from site contaminants. As most characterization was performed at this Site before EPA developed its current risk characterization procedures, ecological risks (*e.g.*, the threats to organisms in the streams and wetland) were not evaluated during the 1988 RI/FS.

[17] *See* Memorandum from Nancy Rios-Jafolla to Melissa Whittington re "Comments" (August 17, 1999)(included in the Administrative Record).

In August 1998, EPA's BTAG determined that the concentrations of both organic and inorganic contaminants detected in the surface water and sediments in the streams originating onsite during the 1988 RI are potentially harmful to ecological receptors. BTAG also concluded that the cPAH Cleanup Standard (*see* footnote 16) is acceptable for soil and sediments from an ecological standpoint. However, the inorganic cleanup standards identified in the 1989 ROD for arsenic (88.8 ppm), cadmium (642 ppm), lead (500 ppm), and copper (4 1.100 ppm), while adequate for soils in the Lagoon Area and the Scraped Area where ecological receptors are not present, are not ecologically protective for stream sediments in the drainage swales and wetland areas at and near the Site. Therefore, BTAG recommended that these inorganic cleanup standards identified in the 1989 ROD be used as soil cleanup standards in the Lagoon Area and the Scraped Area only.

On the basis of its review of existing data in August 1998, BTAG further concluded that OU1 does in fact present an ecological threat. BTAG agreed that environmental protectiveness would be achieved if inorganic compounds in drainage swales 1, 2, and 3 (*see* Figure 4) are cleaned up to background levels. There is no evidence that contamination from the Site has affected the Monongahela River.

VIII. REMEDIATION OBJECTIVES

The specific remediation objectives for source control of soils and sediments are to:

- Eliminate the potential for direct contact with organic contaminants in surface and subsurface soils and sediments that exceed the cPAH Cleanup Standard (*see* footnote 16);
- Eliminate the potential for direct contact with inorganic contaminants in surface and subsurface soils that exceed risk-based cleanup standards established in the September 1989 ROD;
- Reduce or eliminate inorganic contaminants in sediments to the cleanup levels set forth in Table 7 below;
- Reduce the potential for organic and inorganic contaminants in surface and subsurface soils and sediments to migrate to the groundwater or to migrate offsite; and
- Reduce or eliminate the threat of direct contact with contaminants in the landfill; and
- Reduce or eliminate the threat of migration of contaminants from the landfill.

TABLE 7 - SEDIMENT CLEANUP LEVELS	
Contaminant	**(ppm)**
Arsenic	9.62
Cadmium	0.35
Chromium	30.20
Copper	22.70
Lead	31.60
Mercury	ND
Zinc	86.80

IX DESCRIPTION OF REMEDIAL ACTION ALTERNATIVES

The following locations and media at OU1 of the Site warrant action to minimize potential exposure to hazardous substances as described above:

- Onsite surface/subsurface soil in the Scraped Area and the Former Lagoon Area;
- Sediments in the streams (also referred to as drainage swales) originating onsite and in the onsite wetland area;
- Visibly stained tar-like materials in the Scraped Area and Former Lagoon Area and in sediments in the streams/wetlands; and
- The existing, onsite landfill.

This section identifies the remedial alternatives considered by EPA for implementation at OU1 of the Site to reduce unacceptable risks presented in these locations.

Description of Remedial Alternatives

The September 1998 FFS Report presented nine cleanup options for consideration. Option 2 (Institutional Controls Only) in the FFS Report does not meet the threshold criteria (*see* discussion of threshold, balancing, and modifying criteria in Section X - Summary of Comparative Analysis of Alternatives) because it does not provide adequate protection of human health and the environment. Therefore, Option 2 could not be the selected remedy and is not included among the alternatives discussed in detail in this ROD. Treatability studies performed in the course of implementing the remedy selected in the 1989 ROD [18] have demonstrated that Option 7 (bioremediation) is not capable of achieving the cPAH cleanup standards within a reasonable time frame, if at all. Similarly, Option 8 in the 1998 FFS Report (solvent extraction) is not anticipated to be capable of achieving the cPAH cleanup standard. Therefore. Options 7 and 8 from the 1998 FFS Report are also not included among the alternatives discussed in detail in this ROD.

A description of each of the options, referred to as alternatives below, from the 1998 FFS Report that are protective of human health and the environment, achieve State and Federal regulatory requirements, and best achieve the cleanup goals for the Site is provided below. The alternatives presented in this ROD are numbered consecutively and do not necessarily correspond with the numbering system used in the 1998 FFS Report. A description of the alternatives and the detailed analysis of each follows below.

Alternative 1: No Action

Capital Cost:	$0
Annual O&M Cost:	$0
Present Worth Cost:	$0

The NCP requires that EPA consider a "No Action" alternative for every Superfund site to establish a baseline or reference point against which each of the alternatives are compared. In the event that the other alternatives do not offer substantial benefits in the protection of human health and the environment, the No Action alternative may be considered a feasible approach. This alternative leaves the Site in its current state and all current and potential future risks would remain.

Alternative 2: Capping Selected Areas; Excavation and Offsite Treatment of Stream Sediments; Long-Term Monitoring; and Institutional Controls

Capital Cost:	$3,034,686
Annual O&M Cost:	$ 58,800
Present Worth Cost:	$3,767,464

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[18] Option 7 in the 1998 FFS Report (Bioremediation and Landfill Capping).

[19] Although Alternative 1 (No Action) does not meet the threshold criteria, EPA includes the alternative in the detailed analysis as required by the NCP.

Alternative 2 includes the following components:

- Capping areas within the Lagoon Area and the Scraped Area where surface and/or subsurface soils are contaminated with cPAHs in excess of the cPAH Cleanup Standard (see footnote 16) or heavy metals in excess of risk-based cleanup levels established in the 1989 ROD for OU1[20] and capping of the existing landfill with multi-laver caps meeting the performance requirements for landfill closure defined in RCRA Subtitle C regulations and associated guidance; [21]

- Excavation of sediments contaminated with cPAHs in excess of the cPAH Cleanup Standard (*see* footnote 16) and sediments contaminated with inorganic compounds above background levels from the wetland area and drainage swales 1, 2, and 3 (*see* Figures 4 and 5) and transportation of these sediments to an offsite facility for thermal treatment;

- Long-term monitoring;

- Maintenance of the existing perimeter fence; and

- Implementation of institutional controls to protect the cap and prohibit residential development, recreational use, schools and child care facilities.

Health and safety monitoring, including perimeter monitoring of air for organics and dust and health monitoring for job site personnel, would be performed throughout the Remedial Action. This Alternative would also provide appropriate measures to control dust during construction.

Cap Construction

A separate multi-layer RCRA cap would be constructed over soils exceeding the cPAH and metals cleanup standards in the Lagoon Area and the Scraped Area. In addition, a multilayer RCRA cap would be constructed in the Landfill Area which would cover the areal extent

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[20] Those standards are as follows: 88.8 ppm for arsenic, 642 ppm for cadmium, 500 ppm for lead, and 41,100 ppm for copper.

The description of Alternative 2 in the Proposed Plan erroneously omitted that the area to be capped also includes soils exceeding the inorganic soil cleanup standards.

[21] Hereinafter, the term “multi-layer RCRA cap” shall refer to a cap that meets the performance requirements for landfill closure defined in RCRA Subtitle C regulations and associated guidance.

of previously landfilled material and the materials which would be consolidated into the landfill from the 1997 removal action at OU2. Pre-design sampling would be conducted to determine the areal extent of the Landfill Area. The areal extent of the Lagoon Area and Scraped Area is well defined.

The caps would be constructed to minimize infiltration of precipitation throughout these areas as well as to minimize contaminant migration to streams. The caps would also prevent direct exposure to contaminated soils. The caps would be designed in accordance with RCRA Subtitle C closure requirements to, among other things, promote run-off and drainage and minimize erosion. Extensive grading would be needed within the Landfill Area because of the existing exposed face and steep slope on the northeast side.

Surface water controls, including drainage ditches and regrading, would be provided to control run-on and run-off of surface waters. Settling and subsidence would be considered in the design to maintain long-term integrity of the caps.

A multi-layer RCRA cap can vary in design configurations based on site characteristics and intended future use of the capped area. Although the exact configuration of the cap components for OU1 would be determined during remedial design, the typical components of a RCRA multi-layer cap are as follows:

- ***Top Cover:*** This layer is designed to minimize erosion and infiltration of rain water. A vegetative cover is the most common top cover used to protect the underlying layers of a cap, but alternative designs would be evaluated and considered based on anticipated future use of the capped areas (*e.g.*, parking).

- ***Soil Cover:*** This layer is designed to provide sufficient root support for the vegetative cover, if appropriate. It should provide sufficient thickness to protect the underlying layers from vegetative root disturbance, to prevent freeze damage to liner, and should act as a cushion between vehicles and underlying liners, which could be stressed by the movement of vehicles on the surface.

- ***Filter Layer:*** This layer separates the soil cover layer from the drainage layer, thus preventing soil layer fines from clogging the drainage layer. Typically, the filter layer is comprised of sand, gravel, and/or geotextiles.

- ***Biotic Layer:*** This layer, generally consisting of rock and/or geotextiles, prevents ground squirrels, rats, groundhogs, and other burrowing animals from penetrating the impervious layer.

- ***Drainage Layer:*** This layer provides a path that diverts precipitation and runoff from infiltrating into the waste. Material options for the drainage layer generally include multiple layers of geotextile fabrics, sand, and/or gravel.

- ***Low Hydraulic Conductivity Geomembranel Soil Layer:*** This laver reduces the amount of water that percolates down through the soil and which would otherwise come into contact with the underlying waste.

- ***Gas Vent System Layer:*** This layer reduces or eliminates the buildup of gas inside capped areas. The systems used are site-specific and components may vary.

- ***Surface Water Controls:*** This cap component typically includes installation of drainage ditches and regrading of the surrounding area to control run-on and run-off of surface waters.

Site preparation activities would have to be performed at OU1 before cap construction could begin. Site preparation would include mobilization. clearing and grubbing, regrading, miscellaneous site improvements, and surface water control as described below.

It would be necessary to clear certain areas of OU1 of trees, brush, and other vegetation. Removal of tree roots, or grubbing, would also be necessary. Site access roads would be improved, as needed, and temporary utilities (electric, sanitary, potable water. etc.) would be installed.

Surface water would be controlled through the installation of permanent surface run-off controls such as drainage swales, berms, and channels. Additional surface water controls. such as regrading, stabilization of embankments, and revegetation, would be implemented as necessary.

Sediment Excavation

All visibly stained tar-like material in the streams (identified as drainage swales 1, 2, and 3 (*see* Figure 4)) and the wetland area would be excavated. All sediment in the above-mentioned drainage swales that exceed the cPAH Cleanup Standard or are above background levels for inorganic compounds would also be excavated. Prior to excavation activities, sampling would be performed in the drainage swales and wetland areas to ensure that all areas with concentrations of inorganic compounds exceeding background levels are identified. All Work would meet West Virginia Water Quality Standards.

The excavated tar-like material and sediments would be transported to an offsite facility for thermal treatment. Confirmation sampling of excavated areas would be required to ensure achievement of cleanup standards. Analysis of confirmation samples from the streams would include Target Analyte List (“TAL”) metals as well as cPAHs. If confirmation sampling reveals cPAHs at levels in excess of the cPAH Cleanup Standard (*see* footnote 16) or TAL metals for those compounds identified in Table 7 at levels greater than the cleanup standards set forth therein, excavation activities would continue until the cPAH Cleanup Standard is achieved and metals concentrations are at or below the cleanup levels in Table 7 (*see* footnote 23 and accompanying text for details regarding the establishment of the metals cleanup levels). Following excavation, the streams would be restored as described below to minimize erosion of the stream beds.

Stream Restoration and Wetlands Mitigation

Stream restoration activities would be required to prevent flooding or erosion and to help the stream beds recover from excavation activities. Restoration measures could include, among other things, reshaping or lining of stream areas with a geotextile and/or rip-rap to prevent flooding and erosion. Specific stream restoration measures would be determined during the design phase of remediation. However, restoration goals would include maintenance or replacement of existing contours, vegetative characteristics, instrearn aquatic habitat, and vernal pools for the benefit of macro invertebrates and fauna. EPA anticipates that berms would be constructed across the drainageways during construction and or restoration activities to provide further assurance that contaminated sediments are not released and to provide a means to mitigate impacts to the wetland that may result from capping activities. It is anticipated that the resulting retention areas would be planted with aquatic vegetation that would stabilize sediments.

All unavoidable wetland impacts would be clearly documented during design and would include acreage estimates and the type of wetlands affected. All unavoidable losses would be mitigated. The specific size, type, and location of the replacement wetlands, if necessary, would be developed in consultation with Federal and State Natural Resource Trustees and would be set forth in the Remedial Design. Wetland losses would be mitigated "in-kind" and onsite, if possible. Replacing the existing wetland function and values would be the primary mitigation goals.

Long-Term Monitoring

A long-term monitoring program would be required for this alternative because waste materials would be left onsite. Groundwater, surface water, and sediment sampling would be conducted in accordance with a monitoring plan developed during the design phase. EPA presently anticipates that groundwater sampling would be conducted on a quarterly basis and that surface water and sediment sampling would be performed on an annual basis. All sampling would be performed in accordance with an approved sampling and analysis plan. Laboratory analysis would be performed in accordance with EPA protocols. Other elements of the longterm monitoring would include periodic cap inspections. 5-year reviews, maintenance of the perimeter fence installed in 1996, and cap maintenance activities as appropriate (*e.g.*, mowing).

Institutional Controls

Institutional controls are generally intended to isolate human or animal populations from contaminants through, among other things, land use controls and public awareness. Because these controls do not prevent migration of contaminants, long-term monitoring is normally provided to measure the effectiveness of site isolation. In some cases, institutional controls alone will prevent completion of an exposure pathway and protect human populations. Frequently these actions are combined with containment or treatment methods to achieve protectiveness. At OU1 under Alternative 2, institutional controls would be implemented to protect the integrity of the caps, to prohibit residential development, to prohibit recreational use, and to prohibit operation of schools or child care facilities within OU1.

Alternative 3: Consolidation of Contaminated Media; Capping of Existing Landfill; Long-Term Monitoring; and Institutional Controls

Capital Cost: $2,296,260
Annual O&M Cost: $ 52,500
Present Worth Cost: $2,950,526

Alternative 3 consists of consolidating cPAH- and inorganics-contaminated soils and sediments from Lagoon Area, the Scraped Area, and the streams into the existing landfill, which would then be capped. This alternative would involve:

- Excavation of all soils contaminated with cPAHs in excess of the cPAH Cleanup Standard (*see* footnote 16), soils contaminated with inorganic compounds in excess of the inorganic cleanup standards set in the September 1989 ROD (*see* footnote 20), and all visibly stained tar-like material from the Lagoon Area and the Scraped Area;

- Excavation of all sediments contaminated with cPAHs in excess of the cPAH Cleanup Standard (*see* footnote 16), sediments contaminated with inorganic compounds above background levels, and visibly stained tar-like material from the wetland area and drainage swales 1, 2, and 3 (see Figures 4 and 5) as described in Alternative 2;

- Consolidation of the excavated soils and sediments, as well as materials stockpiled onsite from the 1997 removal action at OU2, into the existing landfill;

- Capping the existing landfill using the procedures described in Alternative 2;

- Backfilling. regrading, and revegetating the excavations in the Lagoon Area and the Scraped Area;

- Restoration of streams and wetland areas where sediment was excavated as described in Alternative 2;

- Long-term monitoring;

- Maintenance of the existing perimeter fence. and

- Implementation of institutional controls to protect the cap and prohibit residential development, recreational use, schools and child care facilities.

This alternative is very similar to Alternative 2, but involves consolidation of contaminated media (i.e., soils and sediments above the cPAH and inorganic cleanup standards) from the Lagoon and Scraped Areas and the drainage swales into the existing landfill prior to capping rather than construction of three separate caps. A multi-laver RCRA cap would be constructed over this landfill. The exact specifications for this multi-layer RCRA cap would be determined during Remedial Design. No waste would be shipped offsite for treatment under this alternative.

After excavating the contaminated sediments from the streams, the streams would be restored to minimize erosion of the stream beds. Wetlands mitigation would be required and confirmation sampling for stream sediments would be conducted as described in Alternative 2 (including inorganic analysis of the stream sediments).

Institutional controls would be implemented to protect the integrity of the cap, to prohibit residential development, to prohibit recreational use, and to prohibit operation of schools or child care facilities within OU1.

Site preparation and health and safety monitoring activities similar to those identified in Alternative 2 would be performed under this alternative.

Because waste would be left onsite. the long-term monitoring program (including 5-year reviews) described for Alternative 2 would be required for Alternative 3.

Excavation of Soils

The soils contaminated with total cPAHs or metals in excess of the cleanup standards in the Lagoon and Scraped Areas as well as surface and subsurface debris and visibly stained tar-like materials would be removed from these areas. All debris currently piled onsite or encountered during excavation would be separated from the contaminated soils, temporarily staged, and ultimately disposed of in an appropriate manner (*e.g*., recycled. landfilled. etc.). The actual equipment and methods used in excavation activities would be determined during pre-design and design phases of the remediation.

Excavated areas would be backfilled to maintain acceptable grades and control surface water runoff. The backfill media could originate from offsite source(s) or could be media (verified clean) from the Site, depending on the remedial alternative. Generally. the top 4 to 6 inches of backfill material would be topsoil capable of sustaining plant growth indigenous to the area. Typically, the topsoil would be seeded with grasses. The specific requirements for backfilling and revegetation, if any, would be determined during the design phase of the remediation. When determining the procedures for backfilling, grading, and revegetating excavated areas during design (if appropriate), the anticipated future use of the property will be taken into consideration.

The presence of inorganic contaminants detected during the 1988 RI was not confirmed during the 1996 sampling of the Scraped Area and the Lagoon Area. However, to ensure that unacceptable levels of metals are not left in the soils, analysis of confirmation samples in these areas would include TAL metals. The cleanup standards for metals from the September 1989 ROD (*see* footnote 20) will be applied in the Scraped Area and the Lagoon Area.

Confirmation sampling of the excavations in the Scraped Area and Lagoon Area would be required to ensure achievement of cleanup standards. If confirmation sampling reveals cPAHs or metals at levels greater than the cleanup standards, excavation activities would continue until both the cPAH and metals cleanup standards are achieved.

Alternative 4: Construction of an Onsite RCRA Subtitle C Compliant Landfill; Consolidation of Contaminated Media; Long-Term Monitoring; and Institutional Controls

Capital Cost:	$6,964,103
Annual O&M Cost:	$ 63,000
Present Worth Cost:	$7,749,222

Alternative 4 involves construction of an onsite landfill which meets the requirements of RCRA Subtitle C. This alternative includes the following components:

- Excavation of the existing landfill, including soils contaminated with cPAHs in excess of the cPAH Cleanup Standard (*see* footnote 16), soils contaminated with inorganic compounds in excess of the inorganic cleanup standards set in the September 1989 ROD (*see* footnote 20), miscellaneous debris, and all visibly stained tar-like material;

- Excavation of all soils contaminated with cPAEs in excess of the cPAH Cleanup Standard (*see* footnote 16), soils contaminated with inorganic compounds in excess of the inorganic cleanup standards set in the September 1989 ROD (*see* footnote 20), and all visibly stained tar-like material from the Lagoon Area and the Scraped Area as described in Alternative 3;

- Excavation of all sediments contaminated with cPAHs in excess of the cPAH Cleanup Standard (*see* footnote 16), sediments contaminated with inorganic compounds above background levels, and visibly stained tar-like material from the wetland area and drainage swales 1, 2, and 3 (*see* Figures 4 and 5) as described in Alternative 2;

- Construction of an onsite landfill which meets the requirements of RCRA Subtitle C;

- Consolidation of all excavated soils and sediments, as well as stockpiled material from the 1997 OU2 removal action, into the newly constructed landfill;

- Construction of a multi-layer RCRA cap over the new landfill;

- Backfilling, regrading, and revegetating the excavations in the Lagoon Area and the Scraped Area;

- Backfilling, regrading, and revegetating the excavated landfill;

- Restoration of streams and wetland areas where sediment was excavated as described in Alternative 2;

- Long-term monitoring;

- Maintenance of the existing perimeter fence; and

- Implementation of institutional controls to protect the new landfill and prohibit residential development, recreational use, schools and child care facilities.

For this alternative, all soils and sediments that are contaminated above the cPAH and inorganic cleanup standards would be excavated and consolidated into a newly constructed landfill. This newly constructed landfill would be designed to meet the requirements of RCRA Subtitle C. To prevent exposure to any contaminated materials consolidated into the new landfill, a multi-layer RCRA cap would be constructed over this landfill. The specifications for the cap would be determined during Remedial Design.

The new landfill would be designed to contain all of the wastes from the Landfill Area (approximately 46,773 yd^3); from the Lagoon Area (approximately 24,000 yd^3); from the Scraped Area (approximately 2,000 yd^3); the stream sediments (approximately 500 yd^3), and the materials from the 1997 OU2 removal action that are stockpiled at OU1 (approximately 10,000 yd^3). The capacity of this new landfill is estimated at between 80,000 yd^3 and 105,000 yd^3 (including fill materials) and is estimated to occupy an area between 2 and 4 acres.

Health and safety monitoring activities and dust control measures similar to those identified for Alternative 2 would also be required under this alternative.

Institutional controls would be implemented to protect the integrity of the new RCRA landfill as well as its cap, to prohibit residential development, to prohibit recreational use, and to prohibit operation of schools or child care facilities within OU1.

After excavating the contaminated sediments from the streams, the streams would be restored to minimize erosion of the stream beds. Wetlands mitigation would be required and confirmation sampling for stream sediments would be conducted as described in Alternative 2 (including inorganic analysis of the stream sediments).

Excavations in the Scraped Area, the Lagoon Area, and the Landfill Area would be backfilled, regraded, and seeded. Confirmation sampling for the Lagoon Area, the Scraped Area, and the Landfill Area soils would be conducted as described in Alternative 3.

Because waste would be left onsite, the long-term monitoring program (including 5-year reviews) described for Alternative 2 would be required for Alternative 4.

Alternative 5: Offsite Treatment of Visibly Stained Stream, Lagoon, and Scraped Area Soils/Sediments; Consolidation of Contaminated Media into the Existing Landfill; Capping of Existing Landfill; Long-Term Monitoring; and Institutional Controls

Capital Cost: $6,033,199
Annual O&M Cost: $ 52,500
Present Worth Cost: $6,687,465

Alternative 5 includes the following components:

- Excavation of all visibly stained tar-like material from the Lagoon Area, Scraped Area, and stream sediments and transportation of this visibly contaminated waste material to an offsite thermal treatment facility for treatment;

- Excavation of all soils contaminated with cPAHs in excess of the cPAH Cleanup Standard (*see* footnote 16) and soils contaminated with inorganic compounds in excess of the inorganic cleanup standards set in the September 1989 ROD (*see* footnote 20) from the Lagoon Area and the Scraped Area and consolidation of this contaminated soil into the existing landfill as described in Alternative 3;

- Excavation of all sediments contaminated with cPAHs in excess of the cPAH Cleanup Standard (*see* footnote 16) and sediments contaminated with inorganic compounds above background levels from the wetland area and drainage swales 1, 2, and 3 (*see* Figures 4 and 5) as described in Alternative 2, and consolidation of these sediments into the existing landfill;

- Backfilling, regrading, and revegetating the excavations in the Lagoon Area and the Scraped Area;

- Restoration of streams and wetland areas where sediment was excavated as described in Alternative 2;

- Construction of a multi-layer RCRA cap over the existing landfill;

- Long-term monitoring;

- Maintenance of the existing perimeter fence; and

- Implementation of institutional controls to protect the cap and prohibit residential development, recreational use, schools and child care facilities.

Alternative 5 involves excavating the visibly stained tar-like materials from the Lagoon Area, Scraped Area, and stream sediments and transporting these excavated materials to an offsite thermal treatment facility. Mechanical methods such as a shaker-screen could be used to isolate debris (wood fragments, construction debris, bricks. etc.), tar, and soils. The actual equipment and methods which would be used in excavation and segregation activities will be determined during pre-design and design phases of the remediation. It is appropriate to treat the visibly stained tar-like material differently than the rest of the contaminated soil because it contains extremely high concentrations of cPAHs and is, by virtue of its consistency, less amenable to capping.

All other soils from the Lagoon Area and Scraped Area that contain cPAHs in excess of the cPAH Cleanup Standard (*see* footnote 16) and inorganic compounds in excess of the inorganic cleanup standards set in the September 1989 ROD (*see* footnote 20), but do not contain visibly stained tar-like media, would be excavated and consolidated onto the existing landfill. Similarly, all sediments that contain cPAHs in excess of the cPAH Cleanup Standard or inorganic compounds above background levels, but do not contain visibly stained tar-like media, would also be excavated and consolidated onto the existing landfill. The materials staged at OU1 during the 1997 OU2 removal action would also be consolidated onto the existing landfill.

A multi-laver RCRA cap would be constructed over the existing landfill. The exact specifications for this multi-laver RCRA cap would be determined during Remedial Design.

Health and safety monitoring activities and dust control measures similar to those identified for Alternative 2 would also be required under this alternative.

After excavating the contaminated sediments from the streams, the streams would be restored to minimize erosion of the stream beds. Wetlands mitigation would be required and confirmation sampling for stream sediments would be conducted as described in Alternative 2 (including inorganic analysis of the stream sediments).

Excavations in the Scraped Area and the Lagoon Areas would be backfilled, regraded, and seeded. Confirmation sampling for the Lagoon Area and Scraped Area soils would be conducted as described in Alternative 3.

Institutional controls would be implemented to protect the integrity of the cap, to prohibit residential development, to prohibit recreational use, and to prohibit operation of schools or child care facilities within OU1.

Because waste would be left onsite, the long-term monitoring program (including 5-year reviews) described for Alternative 2 would be required for Alternative 5.

Alternative 6: Offsite Treatment of all Contaminated Stream, Lagoon, and Scraped Area Soils/Sediments; Capping of Existing Landfill; Long Term Monitoring; and Institutional Controls

Capital Cost:	$ 14,517,761
Annual O&M Cost:	$ 52,500
Present Worth Cost:	$ 15,172,027

Alternative 6 includes the following components:

- Excavation of all soils contaminated with cPAHs in excess of the cPAH Cleanup Standard (*see* footnote 16), soils contaminated with inorganic compounds in excess of the inorganic cleanup standards set in the September 1989 ROD (*see* footnote 20), and all visibly stained tar-like material from the Lagoon Area and the Scraped Area. as described in Alternative 3;

- Excavation of all sediments contaminated with cPAHs in excess of the cPAHCleanup Standard (*see* footnote 16), sediments contaminated with inorganic compounds above background levels which are identified in Table 10 of this ROD, and visibly stained tar-like material from the wetland area and drainage swales 1, 2. and 3 (*see* Figures 4 and 5) as described in Alternative 2.

- Transportation of the excavated material as well as material stockpiled from the 1997 OU2 removal action to an offsite thermal treatment facility for treatment:

- Backfilling, regrading, and revegetating the excavations in the Lagoon Area and the Scraped Area;

- Restoration of streams and wetland areas where sediment was excavated as described in Alternative 2;

- Construction of a multi-layer RCRA cap over the existing landfill;

- Long-term monitoring;

- Maintenance of the existing perimeter fence; and

- Implementation of institutional controls to protect the cap and prohibit residential development. recreational use, schools and child care facilities.

Alternative 6 involves excavating all soils and sediments above their respective cleanup standards and visibly stained tar-like material from the Lagoon Area. the Scraped Area and drainage swales 1, 2. and 3 (*see* Figure 4).

All excavated material, as well as the materials staged onsite from the 1997 OU2 removal action, would be transported to an offsite thermal treatment facility for treatment.

A multi-layer RCRA cap would be constructed over the existing landfill. The exact specifications for this cap would be determined during Remedial Design.

Institutional controls would be implemented to protect the integrity of the cap, to prohibit residential development, to prohibit recreational use. and to prohibit operation of schools or child care facilities within OU1.

Health and safety monitoring activities and dust control measures similar to those identified for Alternative 2 would also need to be performed for this alternative.

After excavating the contaminated sediments from the streams, the streams would be restored to minimize erosion of the stream beds. Wetlands mitigation would be required and confirmation sampling for stream sediments would be conducted as described in Alternative 2 (including inorganic analysis of the stream sediments).

Excavations in the Scraped Area and the Lagoon Area would be backfilled. regraded. and seeded. Confirmation sampling for the Lagoon Area and Scraped Area soils would be conducted as described in Alternative 3.

Because waste would be left onsite, the long-term monitoring program (including 5-year reviews) described for Alternative 2 would be required for Alternative 6.

X. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Each of the remedial alternatives summarized in this ROD has been evaluated against the nine evaluation criteria set forth in the NCP (*see* 40 C.F.R. § 300.430(e)(9)). These nine criteria are organized into three categorics--threshold criteria, primary balancing criteria. and modifying criteria. Threshold criteria must be satisfied in order for a remedy to be eligible for selection. Primary balancing criteria are used to weigh major trade-offs between remedies. Modifying criteria are formally taken into account after public comment is received on the Proposed Plan. The criteria, as well as the evaluation of each of the alternatives against such criteria. is set forth below.

Threshold Criteria

1. ***Overall protection of human health and the environment*** determines whether an alternative can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks posed by hazardous substances present at the Site.

2. ***Compliance with Applicable or Relevant and Appropriate Requirements ("ARARs")*** evaluates whether the alternative attains Federal and State environmental statutes, regulations, and other requirements that pertain to the Site.

Primary Balancing Criteria

3. ***Long-term Effectiveness and Permanence*** considers the ability of an alternative to maintain protection of human health and the environment over time.

4. ***Reduction of Toxicity Mobility, or Volume of Contaminants through Treatment*** evaluates an alternative's use of treatment to reduce the harmful effects of contaminants, reduce their ability to move in the environment. and reduce the amount of contamination present.

5. ***Short-Term Effectiveness*** considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

6. ***Implementability*** considers the ease or difficulty of implementing an alternative and includes, among other things, technical feasibility. administrative feasibility, and availability of services and materials.

7. ***Cost*** includes estimated capital and operation and maintenance costs expressed as present worth costs. Present worth cost is the total cost of an alternative over time in today's dollars.

Modifying Criteria

8. ***State Acceptance*** considers whether the State concurs with, opposes, or has no comment on the Selected Remedy.

9. ***Community Acceptance*** considers whether the community agrees with the selected remedy. This is assessed in detail in the ROD responsiveness summary (attached) which addresses public comments received on the Proposed Plan.

A. Overall Protection of Human Health and the Environment

A primary requirement of CERCLA is that the selected remedial alternative be protective of human health and the environment. A remedy is protective if it reduces current and potential risks to acceptable levels, as set forth in the NCP, for each exposure pathway at the Site.

Alternative 1 (No Action), would not effectively reduce risk to human health and the environment. Alternative 1 involves no remediation to address the contamination or risks at OU1 of the Site. Contaminated soils and sediments in the Lagoon Area, Landfill Area, Scraped Area, and streams/wetland would remain. Trespassers and potential future industrial workers could be exposed to potentially harmful levels of contaminants in these soils and sediments. Contaminated surface soil would continue to migrate offsite and into the streams and wetland area. In addition, potentially adverse ecological impacts could continue unabated at the Site.

The "No Action" alternative is considered in the detailed analysis to provide a baseline for comparison with the other remedial alternatives. Because Alternative 1 does not meet the threshold criteria of overall protection of human health and the environment, this alternative will not be considered further in this analysis.

Alternatives 2, 3, 4, 5, and 6 are all protective of human health and the environment. Each of these alternatives reduces the potential for exposure to and migration of OU1 contaminants.

Under Alternative 2, the contaminated soil in the Lagoon Area, Scraped Area. and Landfill Area would remain in place, but the threats presented to human health and the environment through contact or migration would be reduced by capping the contaminants in place. Alternative 3 combines all of the contaminated soils and sediments into one place (the existing landfill) and reduces contact and migration risks through capping. Under Alternative 4, Site risks are reduced by combining all of the onsite contaminated soils and sediments in a newly constructed RCRA Subtitle C compliant landfill. Alternative 5 reduces Site risks by separating and removing the highly concentrated waste to an offsite treatment facility and consolidating and capping the remaining contaminated soil and sediment. Alternative 6 combines capping of the Landfill Area wiih excavation of all remaining OU1 contaminants (soil and sediments in the Lagoon Area. the Scraped Area and the streams) for treatment offsite.

Alternatives 2, 3, 4, 5, and 6 all include long-terrn monitoring to ensure the engineering controls continue to be protective and institutional controls to protect the remedial components and prevent exposure to contaminants remaining onsite.

B. Compliance with ARARs

Any cleanup alternative selected by EPA must comply with all applicable or relevant and appropriate federal and state environmental requirements ("ARARs"). Applicable requirements are those substantive environmental standards, requirements, criteria, or limitations promulgated under federal or state law that are legally applicable to the Remedial Action to be implemented at the Site. *Relevant and appropriate* requirements, while not being directly applicable, address problems or situations sufficiently similar to those encountered at the Site that their use is wellsuited to the particular site.

ARARs are chemical-specific (which pertain to certain substances), action-specific (which pertain to certain activities, such as cap construction), or location-specific (which pertain to certain locations, such as wetlands). An assessment of each of the Alternatives' ability to attain major chemical-, action-, and location-specific ARARs follows.

Chemical-Specific ARARs

There are currently no chemical-specific ARARs establishing acceptable concentrations for contaminants in soil or sediment at OU1 of the Site.

Action-Specific ARARs

Alternatives 2, 3, 5, and 6, which all include construction of RCRA multi-laver cap(s). would meet the substantive requirements of any required RCRA ARARs with regard to closure and post-closure at a RCRA landfill.

Alternative 4, which includes construction of a new RCRA landfill, would meet RCRA ARARs with regard to design, operation, closure. and post-closure of a RCRA landfill.

Alternatives 3, 4, 5, and 6, would meet RCRA hazardous waste ARARs triggered by excavation of contaminated soils including storage time limits, manifesting, and transporting requirements.

Location-Specific ARARs

Alternatives which may disturb wetlands during implementation (Alternatives 2, 3, 4, 5, and 6) would include actions to avoid adverse impacts to such wetlands, minimize wetlands destruction, and preserve and enhance the value of the wetlands, to the extent required by 40 C.F.R. Part 6, Appendix A. In addition, such Alternatives would meet West Virginia Water Quality Standards found at 46 CSR 1.

C. Long-Term Effectiveness and Permanence

Alternatives 2, 3, 4, 5, and 6 would all effectively prevent direct contact exposure to, and migration of, contaminated soils in the Scraped Area. Lagoon Area, and Landfill Area by capping the contaminated soils in place, consolidating contaminated soils into the existing landfill and capping, or consolidating contaminated soils into a newly constructed landfill and capping. Monitoring would, however, be necessary to ensure the long-term effectiveness and permanence of all capping alternatives.

Alternatives 2, 3, and 4 would provide adequate long-term effectiveness as long as the visibly stained tar-like media does not reduce the stability of the caps. The stability issue relates to the ability of the tar-like media to provide a stable base for the various capping layers. Under Alternative 2, the tar-like media would be capped in place; under Alternative 3, all media contaminated above the cleanup standards (including the tar-like media) would be consolidated into the existing landfill and capped; and under Alternative 4, all media contaminated above the cleanup standards (including the tar-like media) would be placed in a newly constructed landfill and capped. EPA anticipates that the stability issue relating to the tar-like media would be less of a concern for Alternative 4, given the large volume of material that would be mixed with the tar-like media prior to landfilling. The cap components of Alternatives 2, 3, and 4 would have to be engineered to take into account the potential instability of the tar-like material.

Alternatives 2, 3, 4, 5, and 6 would reduce risks posed by the contaminants contained in sediments by effectively preventing direct contact exposure to, and migration of, these contaminated sediments. This would be accomplished via excavation of such sediments and either offsite thermal treatment (Alternatives 2, 5, and 6) or consolidation into the existing or newly constructed landfill and capping (Alternatives 3, 4, and 5). No further controls for the excavated stream sediments would be necessary for Alternatives 2 or 6 to ensure long-term effectiveness and permanence.

Alternatives 5 and 6 would eliminate the risks posed by the contaminants contained in the visibly stained tar-like material via offsite thermal treatment. Further controls for those materials would not be necessary to ensure long-term effectiveness and permanence.

D. Reduction of Toxicity, Mobility and Volume

Section 121 (b) of CERCLA, 42 U.S.C. § 9621 (b), establishes a preference for remedial actions which include treatment that permanently and significantly reduces the toxicity, mobility, or volume of contaminants.

The principal threat identified at OU1 is presented by the very high concentrations of cPAHs in the visibly stained tar-like materials present in the Scraped Area, Lagoon Area, and the streams draining the Site. Alternatives 5 and 6 would address this threat via offsite treatment of the tar-like media, thereby reducing toxicity, mobility, and volume of the highest concentrations of contaminants through treatment. Alternative 2 would use treatment to address the threats posed by the tar-like material in the sediments only.

Alternative 2, 3, 4, 5, and 6 would reduce mobility of contaminants remaining onsite through capping, which would reduce infiltration of precipitation and surface erosion.

E. Short-Term Effectiveness

Alternative 2 offers the greatest short-term effectiveness. This alternative requires the least amount of soil-handling activities because it entails the least amount of excavation (stream sediments only) and no consolidation of contaminated soil would be required. Therefore, under this alternative, there would be little potential for exposure of Workers and/or potential trespassers to Site-related contaminants.

Alternatives 3 and 5 achieve very good short-term effectiveness. Although these alternatives require more excavation and handling of contaminated materials than Alternative 2, the level of potential exposure to workers or trespassers to Site-related contaminants would be minimal. Alternatives 5 and 6 involve the excavation and offsite treatment of contaminated soil and could pose an increased short-term health risk to onsite workers and/or potential trespassers during earth-moving activities.

Alternatives 4 and 6 require the most excavation and handling of contaminated materials and thereby pose the greatest short-term risks for exposure of workers and/or trespassers to Site-related contaminants among the alternatives.

All short-term risks to site workers and/or potential trespassers would be minimized using standard safety measures.

There is no significant difference among implementation times for each of the alternatives meeting the threshold criteria. It is anticipated that Alternatives 2, 3, 5, and 6 could be implemented within 6 months from the start of construction. Although Alternative 2 requires a greater area to be capped, this alternative does not require excavation in the Lagoon Area and the Scraped Area and the time required for implementation of this remedy should be comparable to Alternatives 3, 5, and 6. Alternative 4 would have the longest implementation time because it requires construction of a new RCRA compliant landfill. This alternative is estimated to take up to one year to complete.

F. Implementability

Installation of the caps called for in Alternatives 2, 3. 4, 5, and 6 involves well-known construction methods and is easily implementable. Necessary services and materials for caps are readily available. It should be noted however, that Alternatives 2, 3, and 4 would have to be engineered to address the stability issues associated with the tar-like material.

Alternatives 2, 3, 4, 5, and 6 also require some degree of excavation of contaminated soil and sediments. Excavation is similarly a straightforward and commonly performed process using readily available materials and services. Additional sampling and waste characterization would be necessary for these alternatives to ensure the removal of the appropriate volume of soils and sediments. Sampling and analysis are routine activities in the Superfund program. Excavation activities for Alternative 5 would be slightly more difficult to implement than Alternatives 2, 3, 4, and 6 because the additional step of segregating the tar-like material from the remaining contaminated soils and sediments would be required. Segregation methods would be determined in the remedial design phase.

Alternatives 2, 5, and 6 require offsite transportation and treatment of contaminated soils and sediments. Transportation of Site soils and sediments should not pose any unusual technical difficulties and appropriate treatment facilities with capacity for the contaminated soils and sediments should be available within a reasonable distance from the Site.

Alternative 4-construction of a new onsite landfill-would be the most complex alternative to implement. Excavation and storage of contaminated soils and sediments during construction of the new landfill would present complications as space within OU1 is limited. Additional precautions would be necessary to prevent contamination of clean areas used to store excavated contaminants.

Worker exposure and protective equipment requirements for construction activities can be readily achieved for each of the alternatives. Alternatives 2, 3, 4, 5, and 6 would include air monitoring. All alternatives would provide appropriate measures to control dust.

Alternative 2 would be the easiest alternative to implement. Alternatives 3, 5, and 6 would be slightly more difficult to implement because these alternatives require more extensive excavation. Alternative 4 would be the most difficult to implement because it requires construction of a new RCRA compliant landfill as well as the greatest amount of excavation.

G. Cost

Evaluation of the cost of each alternative generally includes the calculation of direct and indirect capital costs and the annual operation and maintenance ("O&M") costs, both calculated on a present worth basis. An estimated capital, annual O&M, and total present worth cost for each of the Alternatives has been calculated for comparative purposes and is presented in Table 8 below.

Direct capital costs include costs of construction, equipment, building and services, and waste treatment. Indirect capital costs include engineering expenses, start-up and shutdown, and contingency allowances. Annual operation and maintenance costs include labor and materials; administrative costs and purchased services; monitoring costs; cost for periodic Site review (at least every five years); and insurance, taxes. and license costs. For cost estimation purposes, a period of 30 years has been used for operation and maintenance. In practice, operation and maintenance of a site with waste left in place would be expected to continue beyond this period. The actual cost for each alternative is expected to be in a range from 50 percent higher than the costs estimated to 30 percent lower than the costs estimated. This cost evaluation was based on the cost estimates prepared by the United States Army Corps of Engineers (USACE).[22]

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[22] Following completion of the September 1998 FFS report, comments from EPA's BTAG required that additional measures regarding remediation and restoration of the stream and wetland areas be added to the options identified in the FFS report. The alternatives in this ROD

TABLE 8 - SUMMARY OF ESTIMATED COST			
Alternative No.	**Capital Cost**	**Annual O&M Cost**	**Present Worth Cost**
2	$ 3,034,686	$ 58,800	$ 3,767,464
3	$ 2,296,260	$ 52,500	$ 2,950,526
4	$ 6,964,103	$ 63,000	$ 7,749,222
5	$ 6,033,199	$ 52,500	$ 6,687,465
6	$ 14,517,761	$ 52,500	$ 15,172,027

H. State Acceptance

The West Virginia Division of Environmental Protection ("WVDEP"), on behalf of the State of West Virginia, concurs with the selected remedy (see Appendix B).

I. Community Acceptance

A public comment period on the Proposed Plan was held from June 7, 1999 (the date the Proposed Plan was issued) through July 8, 1999. On June 23, 1999, EPA and WVDEP conducted a public meeting at the Westwood Middle School gymnasium in Morgantown. West Virginia, to discuss the Proposed Plan. At this meeting, representatives from EPA answered questions about conditions at the Site and the remedial alternatives under consideration.

Comments received orally at the public meeting and in writing during the comment period are presented and addressed in the Responsiveness Summary, which is included in this ROD.

XI. THE SELECTED REMEDY AND PERFORMANCE STANDARDS

Following consideration of the requirements of CERCLA, a detailed analysis of the alternatives using the nine criteria set forth in the NCP, and careful review of public comments, EPA has selected Alternative 5 (Offsite Treatment of Visibly Stained Stream, Lagoon, and Scraped Area Soils/Sediments; Consolidation of Contaminated Media into the Existing Landfill;

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include these additional measures. Using estimates provided by USACE, EPA revised the cost estimates in this ROD to include the costs of these additional stream and wetland remediation and restoration measures.

Capping of Existing Landfill; Long-Term Monitoring; and Institutional Controls) for implementation at OU1 of the Site. The following are the key components of the selected remedy as well as the Performance Standards associated with such components:

1. Excavation of all visibly stained tar-like material from the Lagoon Area, Scraped Area, and stream sediments and transportation of this visibly contaminated waste material to an offsite thermal treatment facility for treatment.

Tar-like material is present throughout OU1 of the Site. The tar-like material is easily distinguishable from contaminated soils because of its distinctive black color and rubber-like, elastic consistency. All such material shall be identified and excavated from the Lagoon Area, the Scraped Area, and the streams/wetland area. Throughout the soils excavation activities (described below), the tar-like material shall be segregated from the contaminated soils and stockpiled onsite until all excavations are complete. All of the stockpiled tar-like material shall then be transported. in accordance with Department of Transportation regulations governing shipment of hazardous wastes. to an offsite facility for thermal treatment to destroy the cPAH contamination. Selection of such treatment facility shall be subject to approval by EPA.

2. Excavation of all soils contaminated with cPAHs in excess of the cPAH Cleanup Standard and soils contaminated with inorganic compounds in excess of the inorganic cleanup standards set in the September 1989 ROD from the Lagoon Area and the Scraped Area and consolidation of this contaminated soil into the existing landfill.

Contaminated surficial and subsurface soils in the Lagoon Area and the Scraped Area shall be excavated and consolidated into the existing landfill prior to capping. Following excavation of such soils, confirmation sampling shall be conducted to ensure all soils contaminated above cleanup standards have been removed. The excavations shall then be backfilled. regraded, and seeded.

Excavation of contaminated surface and subsurface soils within the Lagoon and Scraped Areas shall continue until (1) all soils contaminated with total cPAHs in excess of 78 ppm have been removed, (2) all soils contaminated with B(a)P equivalents in excess of 18.2 ppm have been removed, and (3) all soils contaminated with inorganic compounds exceeding any of the levels identified in Table 9, below, have been removed:

TABLE 9 - INORGANIC CLEANUP LEVELS FOR SOILS IN LAGOON AND SCRAPPED AREAS	
Contaminated	**Cleanup Level**
Arsenic	88.8 ppm
Cadmium	642 ppm
Copper	41,100 ppm
Lead	500 ppm

As indicated above, achievement of the cPAH Cleanup Standard shall include achievement of 78 ppm total cPAHs and achievement of 18.2 ppm B(a)P equivalent. All excavated soils shall be consolidated into the existing landfill prior to capping.

Confirmation sampling shall be conducted in accordance with an EPA-approved sampling plan which shall include, at a minimum, collection of grab samples from the bottom and sides of the excavation and analysis of such samples for TAL metals and Semi-Volatile Organic Compounds ("SVOC") in accordance with EPA protocols.

After confirmation sampling has confirmed that the above-described contaminated soils have been removed, the excavations shall be backfilled with clean fill material. Erosion control measures (*e.g.*, seeding) shall be implemented.

3. Excavation of all sediments contaminated with cPAHs in excess of file cPAH Cleanup Standard and all sediments contaminated with inorganic compounds above background levels from drainage swales 1, 2, and 3 and the wetland area, and consolidation of these sediments into the existing landfill.

At present, the full extent of inorganic contamination in the streams and the wetland area is not known. In addition, the full extent of cPAH contamination in the wetland area is not known. Prior to sediment excavation activities, streams and wetland area sediments shall be sampled in accordance with an EPA-approved sampling plan. Stream sediment samples shall be analyzed for TAL metals. Wetland sediment samples shall be analyzed for TAL metals and cPAHs. The results of such sediment sampling will be used to identify the areas of the streams and wetland that may contain inorganic contamination above background levels and areas of the wetland that may contain cPAH contamination above 78 ppm total cPAHs and 18.2 ppm B(a)P equivalents. The areas to be excavated shall be based on the above-described inorganic sampling data as well as the extensive cPAH data obtained during the 1996 Phase II Interim Design activities. A summary of the results of this sampling event are found in Table 3 on page 11 of this ROD.

Contaminated sediments in the streams and wetland area which exceed either the above described cleanup level for cPAHs or the background levels for inorganics shall be excavated. This excavated sediment shall then be dewatered and consolidated into the existing landfill prior to capping. Following excavation of such sediment, confirmation sampling shall be conducted to ensure all sediment contaminated above these cleanup standards has been removed.

Excavation of contaminated sediments shall continue until (1) all sediments contaminated with total cPAHs in excess of 78 ppm have been removed, (2) all sediments contaminated with B(a)P equivalents in excess of 18.2 ppm have been removed, and (3)) all sediments contaminated with inorganic compounds exceeding any of the levels identified in Table 10, below, have been removed.23

TABLE 9 - INORGANIC CLEANUP LEVELS FOR SEDIMENTS IN STREAMS AND WETLANDS

Contaminated	Cleanup Level
Arsenic	9.62 ppm
Cadmium	0.35 ppm
Chromium	30.2 ppm
Copper	22.7 ppm
Lead	31.6 ppm
Mercury	Non-detect
Zinc	86.8 ppm

[23]Background levels were calculated using sample data obtained during a June 23, 1994 assessment performed on behalf of the Site owner in support of the proposed sale of a portion of the property (*see* "Report of Findings, Sediment and Soil Sampling for Proposed Outsale Property Ordnance Works Disposal Areas Super Fund Site, Operable Unit Two" (August 1994) in the Administrative Record). The background for each contaminant was calculated by taking the mean concentration for each contaminant based on the June 1994 samples. The cleanup levels are equivalent to the mean concentration of each contaminant plus one standard deviation. EPA's BTAG agrees that such levels are protective of the environment (*see* Memorandum from Jeffrey Tuttle (Biologist, USEPA Biological Technical Assistance Group) re "Inorganic Cleanup Levels for Sediments in Streams and Wetlands" (September 20, 1999), also in the Administrative Record).

As indicated above. achievement of the cPAH Cleanup Standard shall include achievement of 78 ppm total cPAHs and achievement of 18.2 ppm B(a)P equivalent. All excavated soils shall be consolidated into the existing landfill prior to capping.

Confirmation sampling shall be conducted in accordance with an EPA-approved sampling plan which shall include, at a minimum, collection of samples from an area immediately adjacent to and downstream of the excavated sediments and analysis of such samples for TAL metals and SVOCs in accordance with EPA protocols. All work shall meet West Virginia Water Quality Standards.

Reasonable efforts will be taken to protect wildlife from harm during the excavation activities including, among other things, temporary relocation of such wildlife if necessary.

4. Consolidation of OU2 Materials.

The materials that were stockpiled at OU1 during the 1997 OU2 removal action shall be consolidated into the existing landfill prior to capping. For purposes of this ROD. the stockpiled materials shall include all cPAH- and lead-contaminated rubble formerly located along the southern coke oven and lead- and cPAH-contaminated soil that was excavated and moved to OU1 during a removal response action completed in 1997. This material is approximately 10,000 cubic yards in volume and was stockpiled adjacent to the landfill's west side. This stockpiled material was then covered with eight inches to one foot of soil, mulched, and seeded.

Following consolidation of such OU2 material into the existing landfill, confirmation sampling shall be conducted in the area where such material was stockpiled to ensure that no contamination above 78 pprn total cPAHs, above 18.2 ppm B(a)P equivalents, or above 500 ppm lead is left in this area. This confirmation sampling shall be conducted in accordance with an EPA-approved sampling plan which shall include a minimum of two grab samples analyzed for TAL metals and SVOCs in accordance with EPA protocols.

5. Restoration of streams and wedand areas where sediment was excavated

The streams and wetland areas shall be restored to prevent flooding or erosion and to help the stream beds recover from excavation activities. Restoration goals shall include maintenance or replacement of existing contours, vegetative characteristics, instrearn aquatic habitat, and vernal pools for the benefit of macroinvertebrates, and fauna. Specific stream restoration measures shall be determined during Remedial Design and shall be implemented in accordance with an EPA-approved Stream Restoration Plan.

All unavoidable wetland impacts shall be clearly documented during design and shall include acreage estimates and the type of wetlands affected. All unavoidable wetland losses shall be mitigated.

Specific wetlands mitigation measures shall be determined during Remedial Design and shall be implemented in accordance with an EPA-approved wetlands mitigation plan. The specific size, type, and location of the replacement wetlands, if any, shall be developed in consultation with Federal and State Natural Resource Trustees and shall be determined durine Remedial Design. Wetland losses shall be mitigated "in-kind" and onsite, if deemed appropriate by EPA. Replacing the existing wetland function and values shall be the primary wetland mitigation goals.

6. Construction of a multi-layer RCRA cap over the existing landfill.

Following consolidation of soils and sediments from various areas of the Site, a multi-layer RCRA cap shall be installed over the existing landfill. The exact areal extent of the landfill shall be determined during Remedial Design. The cap will prevent direct contact with. and inhalation of, potentially harmful dust generated from contaminated soil. The cap will also prevent offsite migration of contaminated soil and reduce the amount of precipitation which infiltrates through contaminated soil above the water table and into the ground water.

A multi-layer RCRA cap shall be installed over the existing landfill. This cap shall be designed, constructed, and maintained to meet the performance requirements of RCRA Subtitle C regulations found at 40 C.F.R. § 265.19, 265.111, 265.117, 265.118, and 265.310. The cap shall cover the areal extent of the existing landfill as determined during Remedial Design.

The cap shall also be designed to meet the performance requirements of the following EPA technical guidance documents: "Final Covers on Hazardous Waste Landfills and Surface Impoundments" (EPA/530-SW-89-047, July 1989); "Design and Construction of RCRA/CERCLA Final Covers" (EPA/625/4-91/025, May 1991) and "Construction Quality Management for Remedial Action and Remedial Design Waste Containment Systems" (EPA/540/R-92/073, October 1992).

The cap shall be designed to minimize infiltration, control surface water run on/runoff, and collect and monitor landfill gas (when necessary to protect the cap and prevent the uncontrolled release of landfill gasses). Cap construction/characteristics shall also include, at a minimum, the following:

- Surface water drainage controls, including drainage channels, will be constructed to prevent erosion of the cap and to channel runoff away from the landfill.

- The top layer shall consist of two components: (1) either a vegetated or armored surface component, selected to minimize erosion and, to the extent possible, promote drainage from the cover, and (2) a soil component with a minimum thickness of 60 cm (24 inches), comprised of topsoil and/or fill soil as appropriate, the surface of which slopes uniformly at least 3 percent but not more than 5 percent. A soil component of greater thickness may be required to assure that the underlying low-permeability layer is below the frost zone.

- A drainage layer shall be installed above the synthetic barrier to allow water to drain off the synthetic barrier and to prevent the ponding of water over the synthetic barrier. If this layer is soil, it shall have a minimum thickness of 30-cm (12 inch) with a minimum hydraulic conductivity of 1×10^{-2} cm/sec and a minimum transmissivity of no less than 3×10^{-5} m^2/sec. This soil layer is intended to minimize water infiltration into the low hydraulic conductivity layer and should have a final slope of at least 3 percent after settlement and subsidence. The drainage layer can be comprised of a geosynthetic material having the above hydraulic characteristics.

- The top low hydraulic conductivity layer shall be a synthetic barrier. This will be the main barrier which prevents water infiltration from entering the landfill. This synthetic barrier shall be a type of flexible geomembrane at least 40 mil thick. The type of flexible geomembrane shall be selected to prevent infiltration and minimize the potential for sliding. Selection of this material shall occur during remedial design.

- The bottom low hydraulic conductivity layer shall be installed to minimize potential leakage through the low hydraulic conductivity geomembrane into the landfill. This layer acts as a safeguard to the geomembrane and is generally made of clay or a geosynthetic clay liner (“GCL”). The bottom layer for the selected remedy shall be a GCL. However, GCLs cannot be placed on very steep slopes. The side slopes of the composite barrier layer shall be on a 4:1 angle and may, if needed to increase the friction angle for the GCL, be reinforced with a geogrid. This layer shall have ahydraulic conductivity no greater than 1×10^{-7} cm/sec.

- A gas management layer may be installed, if necessary to protect the cap and prevent the uncontrolled release of landfill gasses.

An engineered surface water runoff and erosion control system will be designed and installed to control surface water runoff. The system will include surface grading and storm water retention basins and outfall structures, as necessary. The design for the erosion control system shall be subject to EPA approval.

Specific plans for maintenance of the cap and surface water control structures shall be included in the Operation and Maintenance Plan (“O&M Plan”), Maintenance of these components shall continue for 30 years from construction completion or such other time period as EPA, in consultation with WVDEP, determines to be necessary, based on the statutory reviews of the Remedial Action conducted no less often than every five years.

7. Long-Term Monitoring

Long-term ecological monitoring will be performed to confirm that the RCRA cap is preventing offsite migration of Site-related contaminants. The ecological monitoring program shall include sediment and surface water sampling in the streams and the wetland area. The specific monitoring program will be developed during the Remedial Design and shall be subject to EPA approval.

Periodic monitoring of groundwater will be conducted to ensure that the selected remedy is preventing migration of Site-related contaminants into the groundwater. The specific ground water monitoring plan will be developed during the Remedial Design and shall be subject to EPA approval. The ground water monitoring well network will be comprised of a combination of existing and new monitoring wells established to optimize the monitoring program. All monitoring wells must be designed, installed, maintained, and abandoned in accordance with the substantive provisions of the West Virginia Groundwater Protection Act (see Appendix A).

Long-term ecological and groundwater monitoring shall continue for 30 years from construction completion or such other time period as EPA, in consultation with WVDEP, determines to be necessary based on the statutory reviews of the Remedial Action conducted no less often than every five years from the initiation of the Remedial Action in accordance with the applicable guidance.

8. Maintenance of the Perimeter Fence.

OU1 is currently enclosed by a perimeter fence. Following completion of the Remedial Action the fence may, upon approval by EPA, be reconfigured to enclose only those areas where wastes have been managed in place (*e.g.*, the existing landfill). The existing perimeter fence, as well as any fence subsequently reconfigured, shall be maintained to prevent access to the contaminated and capped areas by trespassers.

9. Institutional Controls.

The integrity of the cap shall be protected through the implementation of institutional controls. Residential development, recreational use, schools, and child care facilities shall be prohibited within OU1. Institutional controls shall be implemented to accomplish these objectives in accordance with an EPA-approved plan to be developed during Remedial Design.

10. Five-Year Reviews.

Five-year statutory reviews under section 121(c) of CERCLA, 42 U.S.C. § 9621(c), will be performed as long as hazardous substances remain onsite. Five-year reviews will be conducted after the remedy is implemented to assure that the remedy continues to protect human health and the environment.

XII. STATUTORY DETERMINATIONS

Section 121 of CERCLA, 42 U.S.C. § 962 1, requires that EPA select a remedial action that is protective of human health and the environment, complies with ARARs, is cost effective, and utilizes permanent treatment technologies to the maximum extent practicable. This section describes how the selected remedy meets these statutory requirements.

A. Protection of Human Health and the Environment

Based on the Endangerment Assessment for OU1, EPA concludes that action should be taken to reduce potential risk from cPAHs and heavy metals in the soil and sediments at the Site. Such action is necessary because potential health hazards for some exposure scenarios evaluated in the Endangerment Assessment exceeded EPA's target range of 1.0×10^{-4} (or 1 in 1,000,000) to 1.0×10^{-4} (or 1 in 10,000) for increased lifetime cancer risk. In addition, EPA concludes that concentrations of inorganic contaminants in surface water and sediments present an unacceptable risk to ecological receptors. These risks were considered in establishing the Remediation Objectives set forth in Section VIII of this ROD.

The capping and consolidation of soil and sediment into the existing landfill called for in the selected remedy will prevent direct contact with organic contaminants in soils and sediments that exceed the cPAH Cleanup Standard, prevent direct contact with inorganic contaminants in soils that exceed risk-based cleanup standards, reduce or eliminate inorganic contaminants in sediments that exceed background levels, reduce the potential for organic and inorganic contaminants in soils and sediments to migrate to the groundwater or to migrate offsite, reduce or eliminate the threat of direct contact with contaminants in the landfill and reduce or eliminate the threat of migration of contaminants from the landfill. Implementation of the selected remedy will thereby reduce the human health risks presented by OU1 to within EPA's target risk range and prevent exposure of ecological receptors to harmful levels of Site-related contamination in sediment and surface water in the onsite streams and wetland area.

The institutional controls called for in the selected remedy will help preserve the integrity of the cap and prevent exposure to sensitive populations (*e.g.*, children) to onsite contaminants.

Implementation of the selected remedy will not pose any unacceptable short term risks or cross media impacts to the Site or the community.

B. Compliance with and Attainment of Applicable or Relevant and Appropriate Requirements ("ARARs")

The selected remedy will comply with all applicable or relevant and appropriate chemical-specific, location-specific, and action-specific ARARs. Those ARARs are identified in Appendix A.

C. Cost-Effectiveness

Section 300.430(f)(1)(ii)(D) of the NCP, 40 C.F.R. § 300.430(f)(1)(ii)(D)), requires EPA to evaluate cost-effectiveness by comparing all the alternatives which meet the threshold criteria-protection of human health and the environment and compliance with ARARs--against long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment: and short-term effectiveness. The NCP further states that overall effectiveness is then compared to cost to ensure that the remedy is cost effective and that a remedy is cost effective if its costs are proportional to its overall effectiveness.

EPA concludes, following an evaluation of these criteria, that the selected remedy is cost-effective in providing overall protection in proportion to cost and meets all other requirements of CERCLA. The estimated present worth cost for the selected remedy is $6,687,465.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The principal threat presented by the tar-like material at OU1 will be eliminated by offsite thermal treatment of such material. The reduction of highly concentrated cPAHs will be permanent. An alternative treatment technology will not be utilized. The remainder of the selected remedy addresses lower-level threats through waste containment, institutional controls, and long-term monitoring and maintenance to provide the necessary level of protection to human health and the environiment.

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost effective manner for OU1. Of those remedial alternative combinations that are protective of human health and the environment and comply with ARARs, EPA has determined that the selected remedy provides the best balance in terms of short-term effectiveness; long-term effectiveness; implementability; cost; reduction in toxicity, mobility, and volume; and State and community acceptance.

E. Preference for Treatment as a Principal Element

The selected remedy satisfies the preference for treatment in that it employs treatment to address the principal threat posed by conditions at OU1 of the Site (i.e., the tar-like materials). The remaining lower- level threats at OU1 will be addressed via waste containment, institutional controls, and long-term monitoring and maintenance.

RESPONSIVENESS SUMMARY
ORDNANCE WORKS DISPOSAL AREAS SUPERFUND SITE
OPERABLE UNIT ONE
MORGANTOWN, MONONGALIA COUNTY, WEST VIRGINIA

This community relations responsiveness summary is divided into the following sections:

Overview: This section discusses EPA's preferred alternative for remedial action.

Background: This section provides a brief history of community interest and concerns raised during remedial planning at the Ordnance Works Disposal Areas Site.

Part I: This section provides a summary of issues and concerns raised by the local community at the public meeting on June 23, 1999. “Local community” includes local homeowners, businesses, the municipality, and potentially responsible parties (“PRPs”).

Part II: This section provides a summary of commentors' issues received in writing throughout the comment period.

OVERVIEW

On June 7, 1999, EPA published its preferred alternative for the Ordnance Works Disposal Areas Superfund Site. Operable Unit One (“OU1"), located in Morgantown. Monongalia County, West Virginia, and announced the public comment period. EPA screened six possible alternatives to remediate soil and sediment contamination, giving consideration to nine key evaluation criteria found in the NCP:

! Threshold criteria, including

-- Overall protection of human health and the environment
-- Compliance with Federal and state environmental laws

! Balancing criteria, including

-- Long-term effectiveness
-- Short-term effectiveness
-- Reduction of mobility, toxicity, or volume
-- Ability to implement
-- Cost, and

- Modifying criteria. including

  - State acceptance, and
  - Community acceptance

The selected remedy, Alternative 5, includes the following components:

- **Excavation and Offsite Treatment of Tar-Like Material:** Excavation and offsite treatment of the principal threat waste (tar-like material) to reduce the potential for migration of contaminants to offsite soils and surface water/sediment as well as to reduce the risk due to the potential exposure to such principal threat waste;

- **Consolidation of Contaminated Soils and Sediments:** Excavation and consolidation of soils and sediments contaminated with cPAHs and heavy metals in excess of their respective cleanup standards into the existing landfill;

- **RCRA Cap:** Construction of a RCRA cap over the existing landfill and consolidated soils and sediments to prevent offsite migration of contaminants and to eliminate the potential threat of direct contact with contaminated soils and sediments;

- **Institutional Controls:** Implementation of institutional controls to protect the integrity of the cap, to prohibit residential development, to prohibit recreational use, and to prohibit operation of schools and child care facilities within OU1.

- **Long-Term Ecological and Groundwater Monitoring:** The purpose of such monitoring is to ensure continued protectiveness of the remedy.

BACKGROUND

To obtain public input on the Proposed Remedial Action Plan (Proposed Plan or PRAP), EPA held a public comment period from June 7,1999 to July 8,1999. In addition, EPA held a public meeting on June 23, 1999 to explain the preferred alternative and to answer questions. Local residents and officials, news media representatives, representatives from EPA, and representatives from companies interested in Site activities and cleanup decisions attended the meeting.

EPA notified the public of the June 23, 1999 public meeting and announced the public comment period in a display ad placed in the June 7, 1999 editions of **The Morgantown Dominion Post.** In addition, EPA placed copies of the Proposed Plan in the Site information repository at the Morgantown Public Library. The repository contains the Administrative Record supporting selection of the Remedial Action and includes, among other things, the Remedial Investigation, the Endangerment Assessment, the 1989 and 1998 Feasibility Studies, the Proposed Plan, and other relevant documents upon which EPA relied in selecting the remedial action for OU1.

EPA also prepared a fact sheet which was mailed to the community and local officials and distributed to individuals in attendance at the public meeting. The fact sheet included a summary of the Proposed Plan.

Part 1: Summary of Issues and Concerns Raised at the Public Meeting

This section provides a summary of issues and concerns raised by the local community at the public meeting held on June 23, 1999. Two individuals provided oral comments at the public meeting. Both of these comments covered essentially the same issue and are summarized as follows:

> **Comment:** Both commenters expressed the opinion that removal of the contaminated soils and sediments would be preferable to capping such materials onsite.
>
> ***EPA Response:*** *Under the selected remedial action (Alternative 5), the principal threat presented at OUl of the Site-the highly concentrated carcinogenic polycyclic aromatic hydrocarbons in the visibly stained tar-like material-will be addressed by removing such materials from the Site for treatment. The cap component of the selected remedial action will effectively manage the remaining consolidated wastes in place. Caps are often constructed at sites to prevent the potential for direct contact with the contamination and to prevent the offsite migration of wastes. Capping is a proven technology and has been used at similar sites across the country. While the Superfund law, expresses a preference for treatment of hazardous wastes, the law requires EPA to take cost-effectiveness into account in its selection of remedies. In this case, the cost of excavating all contaminated material and transporting it off site for treatment ($15,172,027.00) is significantly higher than the cost of capping this material and does not yield significantly greater protection of human health or the environment. The selected remedy protects human health and the environment at a more reasonable cost ($6, 687,465.00) and is therefore more cost-effective.*

Part II: Summary of Comments and Questions Received in Writing During the Public Comment Period

This section provides a summary of commentors' issues received in writing throughout the comment period. The Agency received one letter. That letter contained the following substantive comment:

> **Comment:** The commenter was concerned about the use of the “mean background concentration” as a cleanup standard for inorganic contaminants in sediments. Because these values are averages derived from several samples, the commenter expects that some number of samples would naturally be above the “mean background concentration” and yet still be within the acceptable background concentration range.

EPA Response: *EPA agrees. To address this concern, the cleanup standards for inorganic contaminants in sediment have been revised. The cleanup standards in this ROD are now based on the mean value plus one standard deviation as shown in Table 10. The data used in calculating the cleanup levels was limited to the nine (9) samples taken during the June 23, 1994, sampling event conducted on the proposed outsale properly at the Ordnance Works Disposal Areas Superfund Site, Operable Unit Two ("OU2O"). The proposed outsale property consists of a 272.8 acre parcel of land that occupies the westerly portion of the property known as the Morgantown Industrial Park. A detailed description of the property as well as its historical use can be found in the Administrative Record in a report entitled "Report of Findings, Sediment and Soil Sampling for Proposed Outsale Property Ordnance Works Disposal Areas Super Fund Site Operable Unit Two, Mon View Heights of West Virginia ("MVH"), Dupont Road, Morgantown, West Virginia authored by MSES Consultants, Inc. ("MSES") dated August, 1994. See also Memorandum from Ken Brown (Director, USEPA Technical Support Center) re "Statistical Questions Regarding Background Metals Concentrations" (September 20, 1999), also in the Administrative Record.*

Figures

ORDNANCE WORKS DISPOSAL AREAS SUPERFUND SITE REGIONAL SETTING

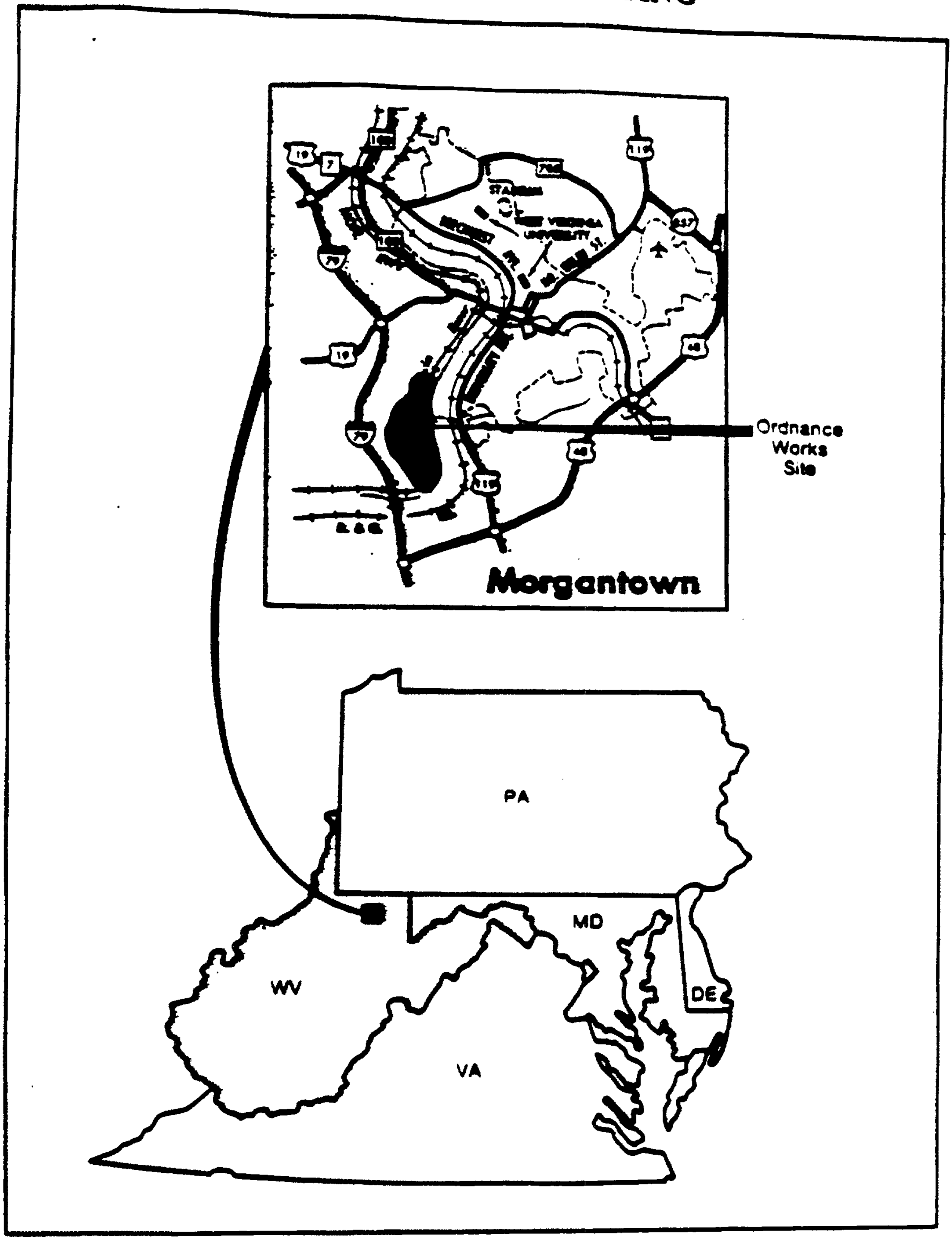
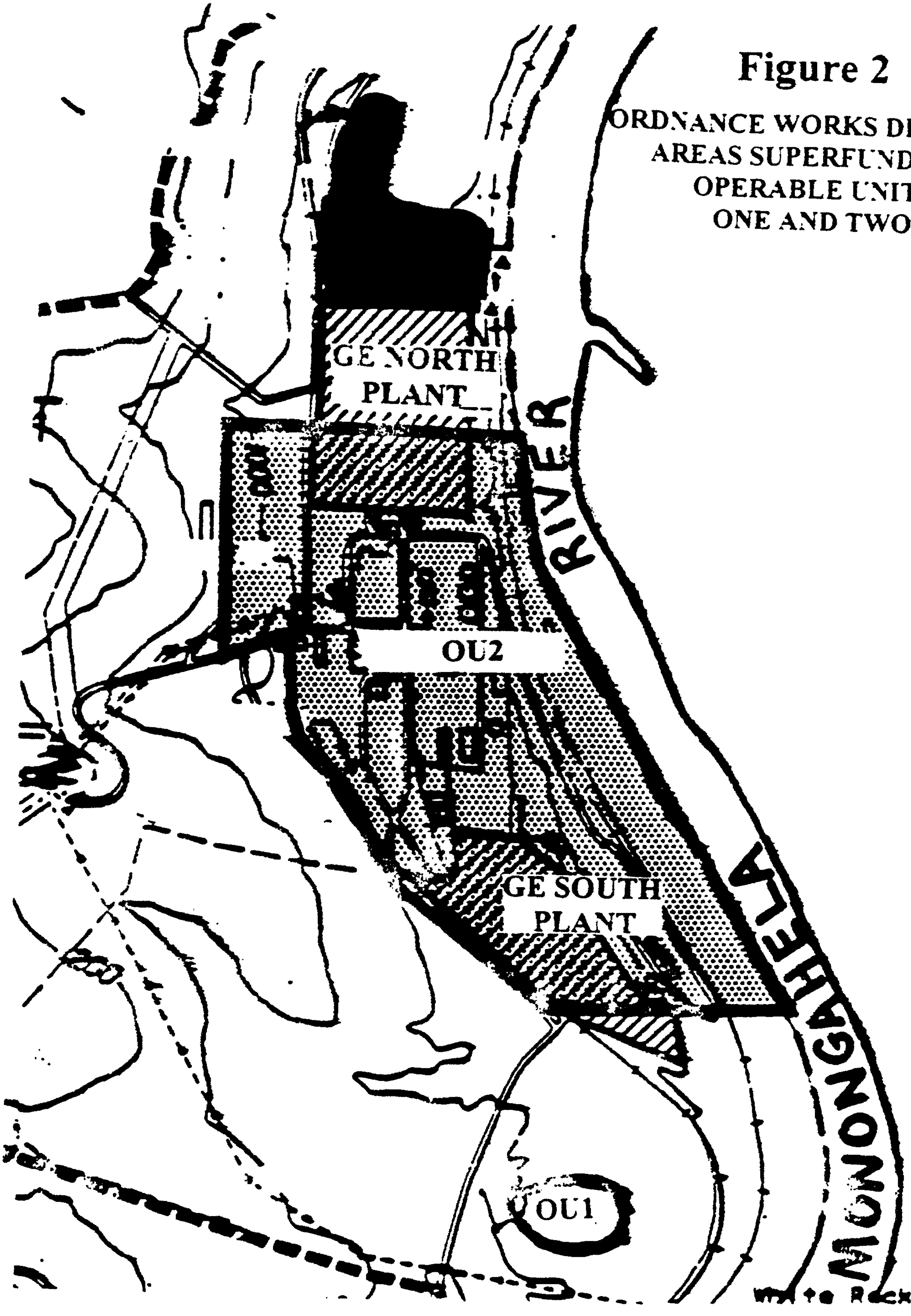
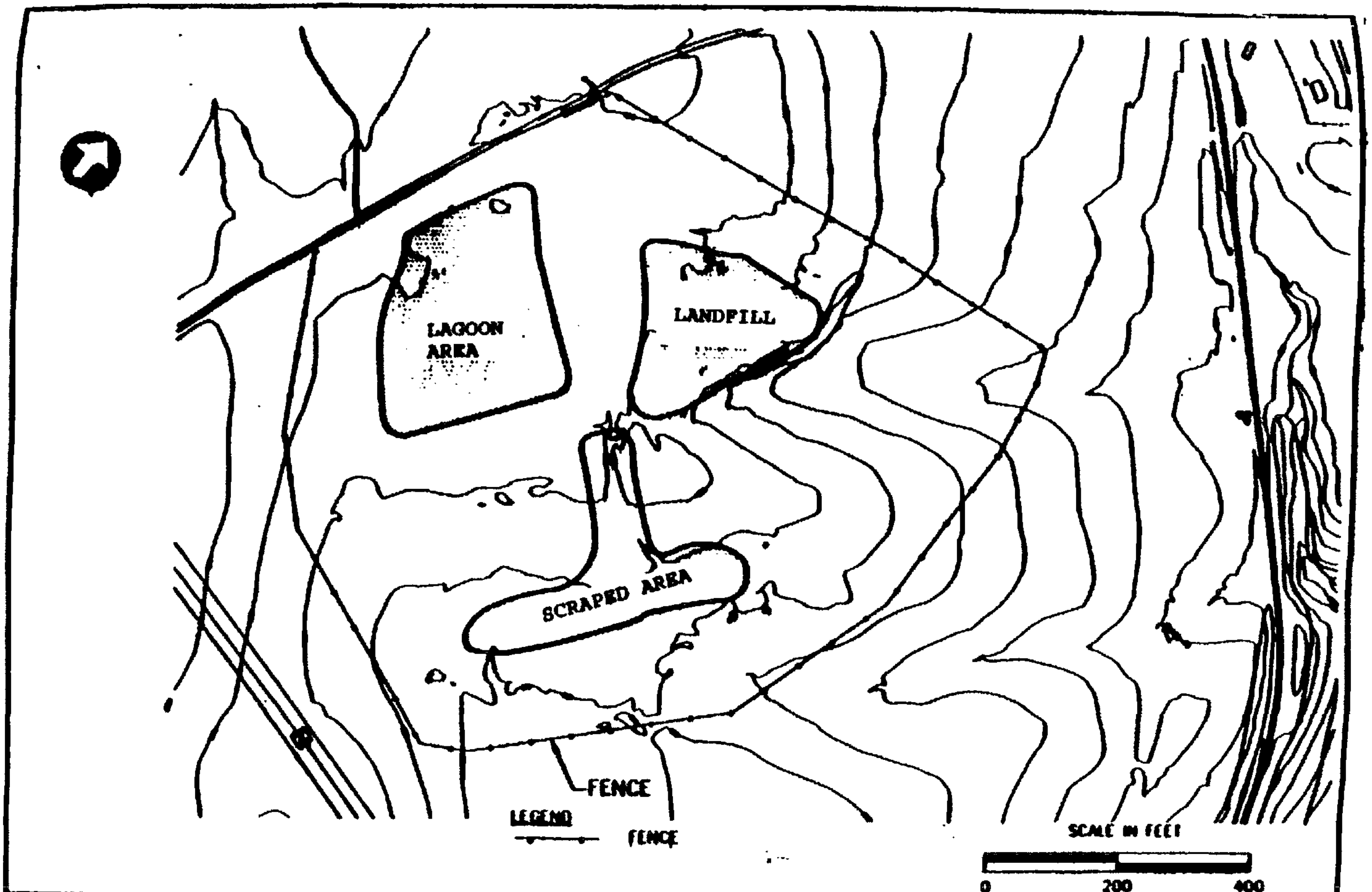


Figure 1

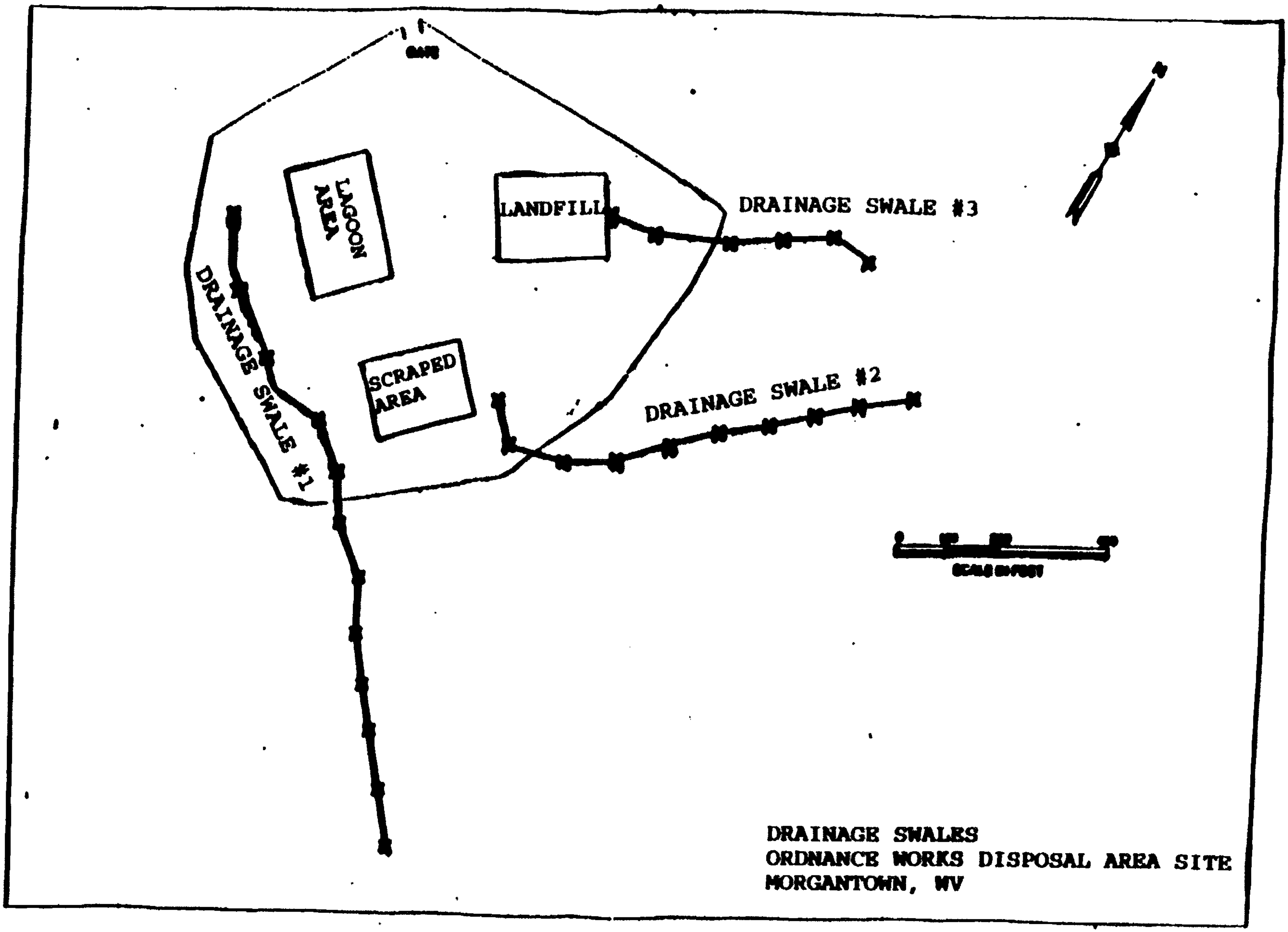
Figure 2

ORDNANCE WORKS DISPOSAL
AREAS SUPERFUND SITE
OPERABLE UNITS
ONE AND TWO



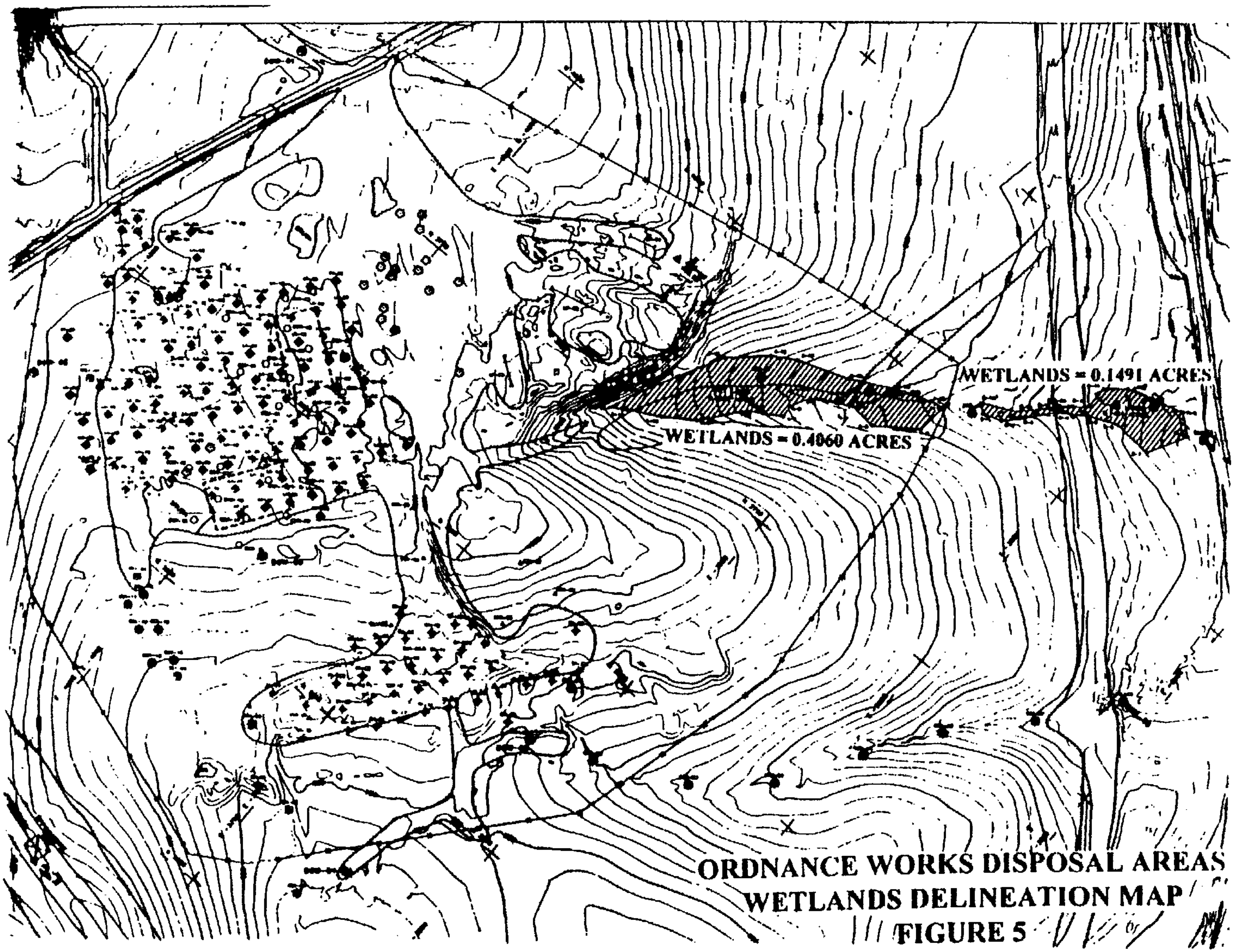


OPERABLE UNIT ONE	Figure 3	MORGANTOWN ORDNANCE WORKS SITE



LAGOON AREA
LANDFILL
SCRAPED AREA
DRAINAGE SWALE #1
DRAINAGE SWALE #2
DRAINAGE SWALE #3
DRAINAGE SWALES
ORDNANCE WORKS DISPOSAL AREA SITE
MORGANTOWN, WV

Figure 4



ORDNANCE WORKS DISPOSAL AREAS
WETLANDS DELINEATION MAP
FIGURE 5

Appendix A

Appendix A
Applicable or Relevant and Appropriate Requirements
Ordnance Works Disposal Areas Superfund Site
Morgantown, West Virginia

Statute/Authority	**Regulation**	**Classification**	**Requirement Synopsis**	**Applicable to Selected Remedy**
I. LOCATION SPECIFIC				
Groundwater Protection Act (State)	47 CSR 58-4.10	Relevant and Appropriate	Facility or activity design must adequately address the issues arising from locating in karst, wetlands, faults, subsidences, delineated wellhead protection areas determined vulnerable.	This regulations shall apply if implementation of the remedy affects such vulnerable areas.
Executive Order 119990, Protection of Wetlands (Federal)	40 C.F.R. 6, Appendix A Clean water Act of 1972 (CWA) Section 404	Applicable	Action to minimize the destruction, loss, or degradation of wetlands	This applies to ensure the minimization of wetlands impacts to remedial action activities.

Appendix A
Applicable or Relevant and Appropriate Requirements
Ordnance Works Disposal Areas Superfund Site
Morgantown, West Virginia

II. ACTION SPECIFIC				
Resource Conservation and Recovery Act (Federal)	40 C.F.R. 265.19	Relevant and Appropriate	Construction Quality Assurance Program.	Construction of the cap shall comply with these quality assurance requirements.
Resource Conservation and Recovery Act (Federal)	40 C.F.R. 265.111	Relevant and Appropriate	For a closing facility, owner must minimize need for further maintenance; control, minimize, or eliminate post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the groundwater or surface waters or the atmosphere; and comply with other closure requirements.	Post-closure monitoring and maintenance of the landfill shall comply with these requirements.

Appendix A
Applicable or Relevant and Appropriate Requirement
Ordnance Works Disposal Areas Superfund Site
Morgantown, West Virginia

Resource Conservation and Recovery Act (Federal)	40 C.F.R. 265.114	Relevant and Appropriate	During final closure, all contaminated equipment, structures, and soil must be properly disposed of, or decontaminated.	During implementation of the selected remedy, all required decontamination procedures will be complied with.
Resource Conservation and Recovery Act (Federal)	40 C.F.R. 265.117	Relevant and Appropriate	Post-closure care for each hazardous waste management unit must begin after completion of closure and continue for 30 years after that date. It must consist of monitoring and report of environmental media and maintenance and monitoring of waste containment systems.	Post-closure monitoring and maintenance of the landfill shall comply with these requirements.
Resource Conservation and Recovery and Recovery Act (Federal)	40 C.F.R. 265.118	Relevant and Appropriate	The owner or operator must develop a written post-closure plan. The post-closure plan must identify activities to be carried on after closure and the frequency of these activities.	To ensure the integrity of the cap and the function of the monitoring equipment, post-closure monitoring and maintenance of the landfill shall comply with these requirements.

Appendix A
Applicable or Relevant and Appropriate Requirements
Ordnance Works Disposal Areas Superfund Site
Morgantown, West Virginia

Resource Conservation and Recovery Act (Federal)	40 C.F.R. 265.310	Relevant and Appropriate	Final cover to provide long-term minimization of infiltration. Function with minimum maintenance. Promote drainage and minimize erosion. 30-year post-closure care to ensure site is maintained and monitored.	These requirements shall apply to construction and post closure requirements for the cap.
AIR				
Clean Air Act, National Ambient Air Quality Standards (Federal)	40 C.F.R. Part 50	Applicable	Defines air quality standards that are necessary to protect human health	Applicable if work at the Site affects ambient air quality.
Air Pollution Control Act (State)	45 CSR4	Applicable	Regulations to prevent and control the discharge of air pollutants into the open air which causes or contributes to an objectionable odor or odors.	The remedial action will comply with the substantive requirements of these regulations.

Appendix A
Applicable or Relevant and Appropriate Requirements
Ordnance Works Disposal Areas Superfund Site
Morgantown, West Virginia

Air Pollution Control Act and the Hazardous Waste Management Act (State)	45CSR25-4.3	Relevant and Appropriate	Facilities shall be designed, constructed, maintained, and operated in a manner to minimize hazardous waste constituents to the air.	During construction of the cap and excavation activities, any fugitive air emissions shall be in compliance with this state regulations
Air Pollution Control Act (State)	45CSR27-4.1 thru 4.2	Applicable	Best Available Technology requirements for Fugitive Emissions of Toxic Air Pollutants	During construction of the cap and excavation activities, any fugitive air emissions shall be in compliance with this regulation.
Air Pollution Control Act (State)	45CSR30	Applicable	Requirements for the air quality permitting system.	During construction of the cap and excavation activities, any fugitive air emissions shall be in compliance with the substantive requirements of this regulation.

Appendix A
Applicable or Relevant and Appropriate Requirements
Ordnance Works Disposal Areas Superfund Site
Morgantown, West Virginia

WATER				
Groundwater Protection Act (State)	47CSR58-4.2	Applicable	Subsurface borings of all types shall be constructed, operated and closed in a manner which protects groundwater.	Installation of ne monitoring wells, as well as abandonment of existing monitoring wells (if appropriate) shall comply with this requirement.
Groundwater Protection Act (State)	47CSR58-4.4(a)	Applicable	Loading and unloading stations including but not limited to drums, trucks and railcars shall have spill prevention and control facilities and procedures as well as secondary containment, if appropriate or otherwise required. Spill containment and cleanup equipment shall be readily accessible.	Excavation and offsite transportation of wastes shall comply with these loading requirements.

Appendix A
Applicable or Relevant and Appropriate Requirements
Ordnance Works Disposal Areas Superfund Site
Morgantown, West Virginia

Groundwater Protection Act (State)	47CSR58-4.9.d to 4.9.g	Applicable	Groundwater monitoring stations shall be located and constructed in a manner that allows accurate determination of groundwater quality and levels, and prevents contamination of groundwater through the finished well hole or casing. All groundwater monitoring stations shall be accurately located utilizing latitude and longitude by surveying, or other acceptable means, and coordinates shall be included with all data collected.	Developed and implementation of the long-term groundwater monitoring plan shall comply with these requirements.
Groundwater Protection Act (State)	47CSR58-8.1(c)	Applicable	Adequate groundwater monitoring shall be conducted to demonstrate control and containment of the substance.	Groundwater monitoring program shall comply with this requirement.
Groundwater Protection Act (State)	47 CSR 60-1 to 23	Applicable	Monitoring well design standards.	Monitoring well design shall comply with these standards.

Appendix A
Applicable or Relevant and Appropriate Requirements
Ordnance Works Disposal Areas Superfund Site
Morgantown, West Virginia

Environmental Quality Board (State)	46 CSR 1-1 to 9	Applicable	Requirements governing water quality standards.	The on-site streams and wetlands are designated "for the Propagation and maintenance of Fish and Other Aquatic Life (Category B) and for Water Contact Recreation (Category C) pursuant to 46 CSR1-6.1. The water quality standards established in these regulations will be applicable to the remedial action.
Groundwater Protection Act (State)	47CSR59-1- 47CSR59-9	Applicable	Monitoring well rules.	The remedial action will comply with the substantive requirements for these regulations.
Miscellaneous				
Resource Conservation and Recovery act (Federal)	40 C.F.R. 264. 10 to 264.18	Relevant and Appropriate	Requirements regarding waste analysis, security, training, inspection, and location applicable to a facility that stores, treats, or disposes of hazardous wastes.	These requirements shall be met when handling wastes onsite.
Resource Conservation and Recovery Act (Federal)	40 C.F.R. 262.34	Relevant and Appropriate	Generator may accumulate waste onsite for 90 days or less or must comply with requirements for operating a storage facility.	If it is necessary to store waste onsite during implementation of the selected remedy, this requirements shall apply.

Appendix A

Applicable or Relevant and Appropriate Requirements
Ordnance Works Disposal Areas Superfund Site
Morgantown, West Virginia

Resource Conservation and Recovery Act (Federal)	**40 C.F.R Part 268**	**Relevant and Appropriate**	**Movement of excavated materials to new location and placement in or on land will trigger land disposal restrictions (LDRs) for the excavation waste or closure requirements for the unit in which the waste is being placed.**	**Consolidation of materials within an area of contamination does not trigger LDRs. Therefore, implementation of the selected remedy will be in compliance with this ARAR.**

Appendix B

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(304) 558-3998

West Virginia Division of Environmental Protection

Cecil H. Underwood
Governor

Michael C. Castle
Director

September 29, 1999

Abraham Ferdas, Director, 3HS00
Hazardous Site Cleanup Division
Environmental Protection Agency, Region III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

**Re: State of West Virginia Concurrence with Record of Decision dated September 1999
Operable Unit One
Ordnance Works Disposal Areas Superfund Site
Morgantown, Monongalia County, West Virginia**

Dear Mr. Ferdas:

This letter is to officially express the State of West Virginia, Division of Environmental Protection, Office of Environmental Remediation (OER) concurrence with the Record of Decision (ROD) dated September 1999 for Operable Unit One (OU-1), Ordnance Works Disposal Areas Superfund Site, located in Monongalia County, Morgantown, West Virginia.

The OER has actively participated in the investigation and the assessment of risks potentially present at the site. Additionally, the OER has been actively involved in the selection of the remedy proposed for OU-1.

The State looks forward to the implementation of the selected remedy, which we believe will be protective both to human health and the environment, as well as providing a cost-effective remedy for the site.

Sincerely,

Ken Ellison

Ken Ellison, Chief
Office of Environmental Remediation

cc: Christian Matta, EPA Remedial Project Manager
Peter Ludzia, EPA Program Manager
Mark Slusarski, OER Remedial Project Manager
Project File

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DEP